THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXXVII. No. 2152.] LONDON, AUGUST 9, 1904. [56TH YEAR. PRICE 6d.

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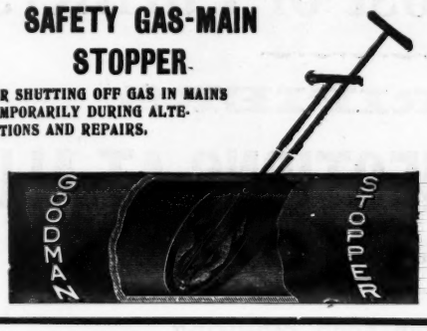

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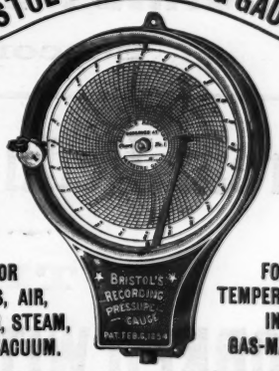

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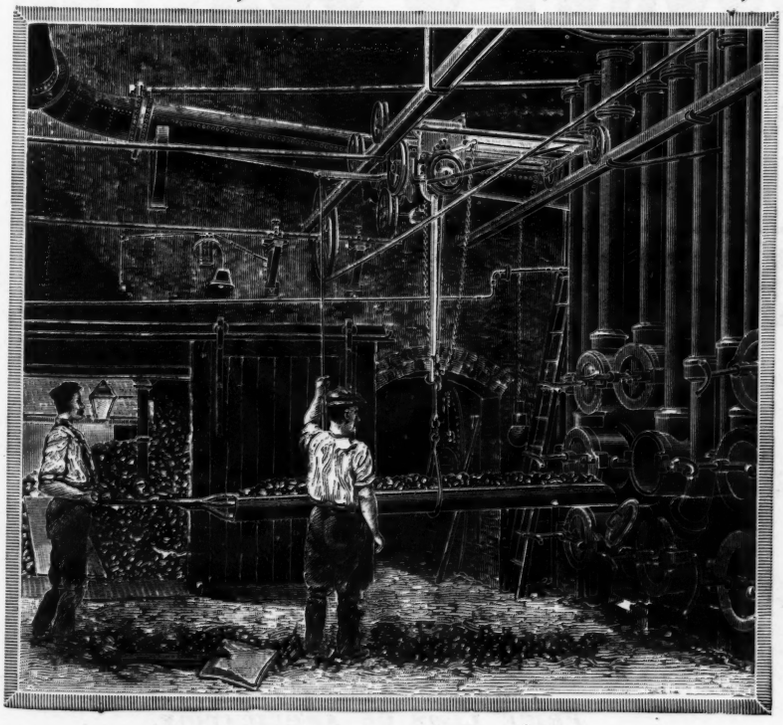

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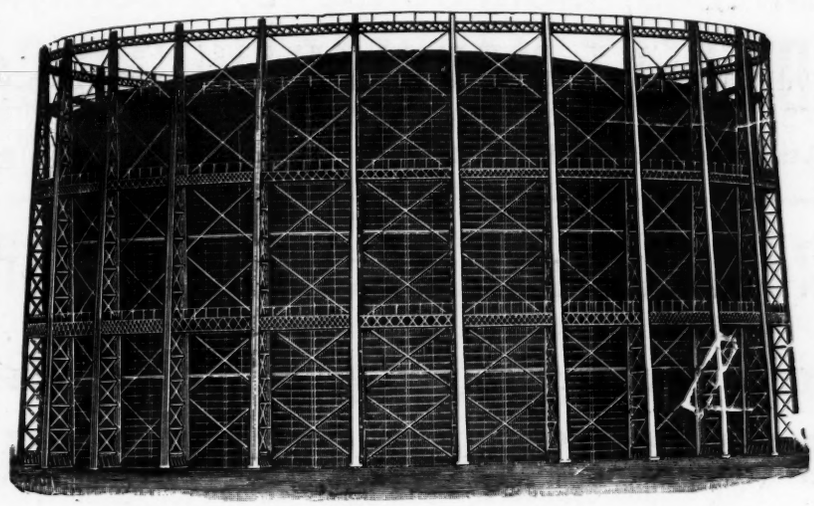

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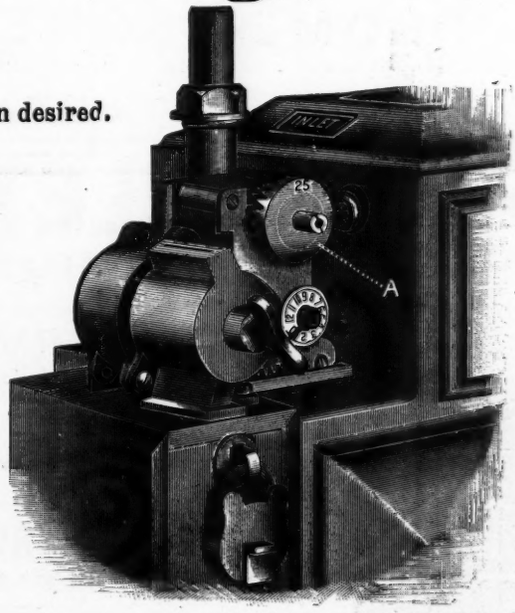

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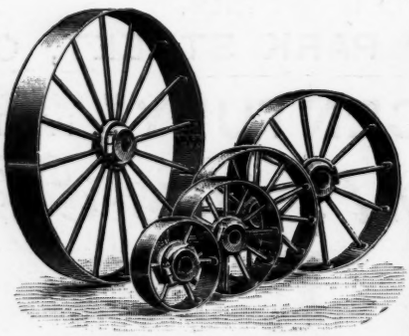

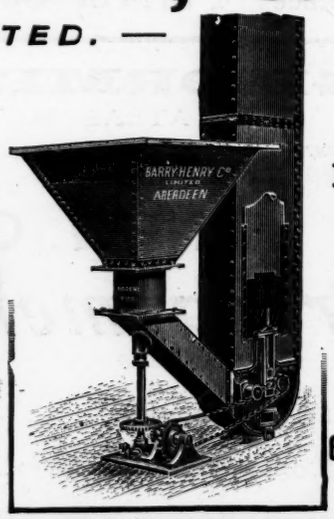

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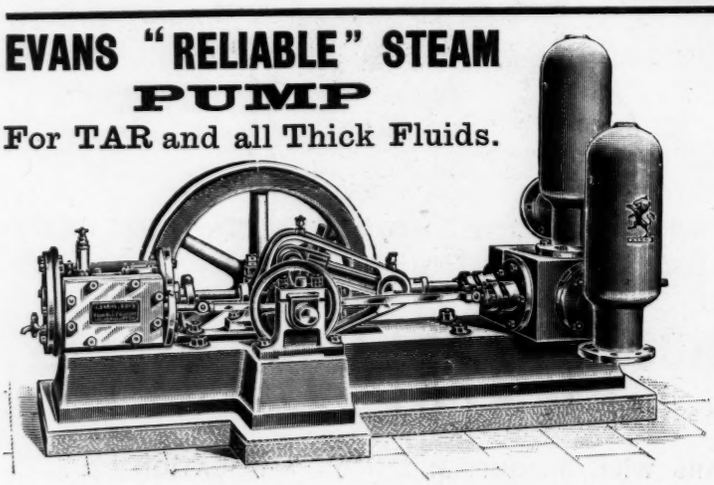

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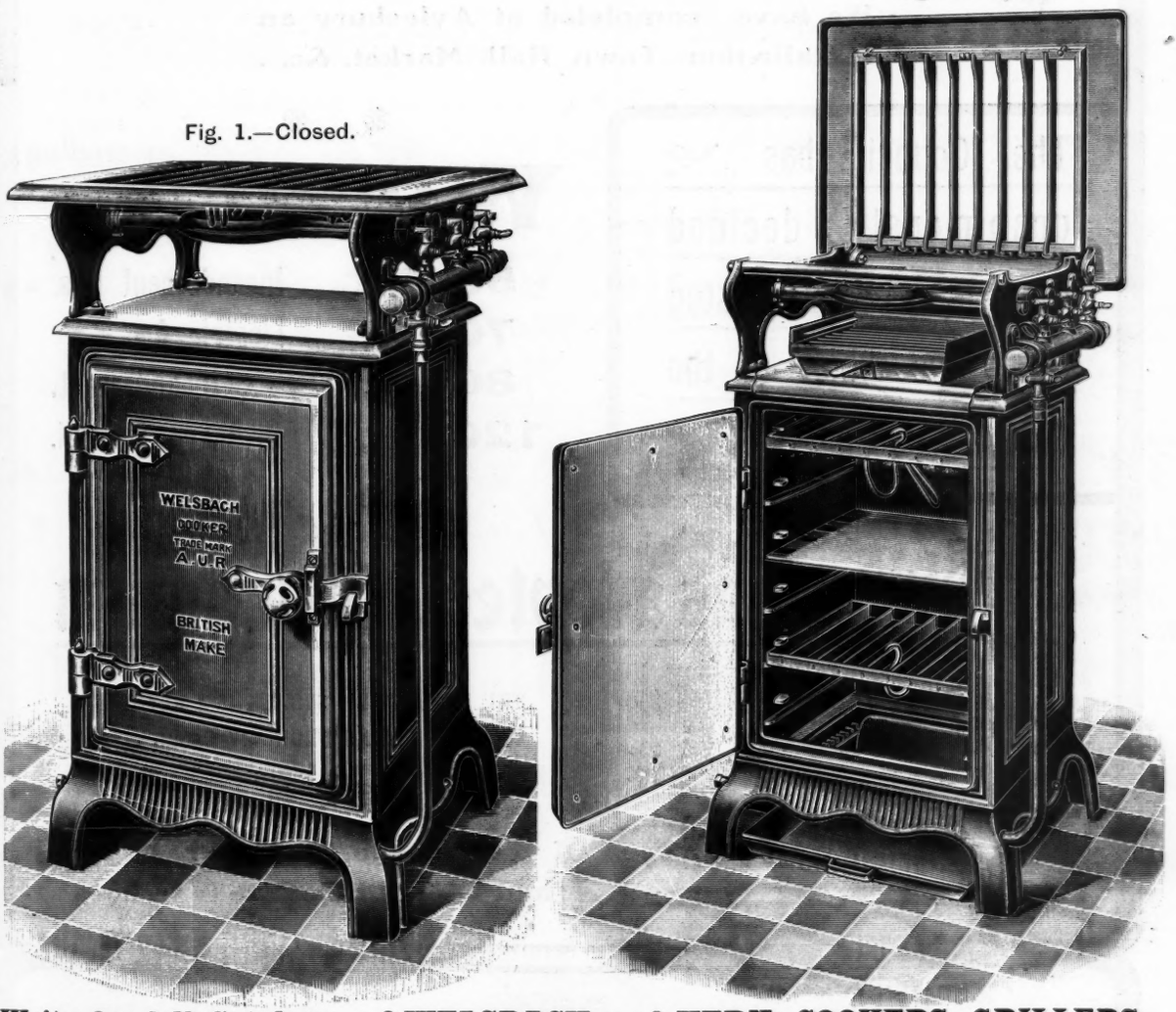

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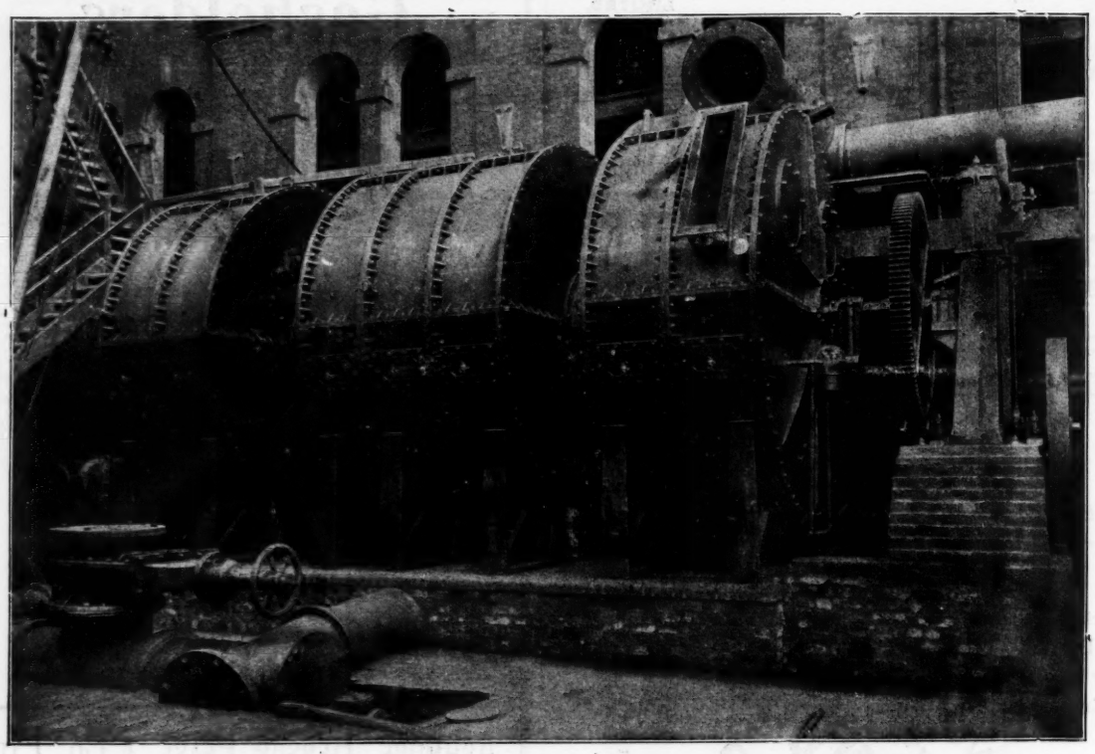

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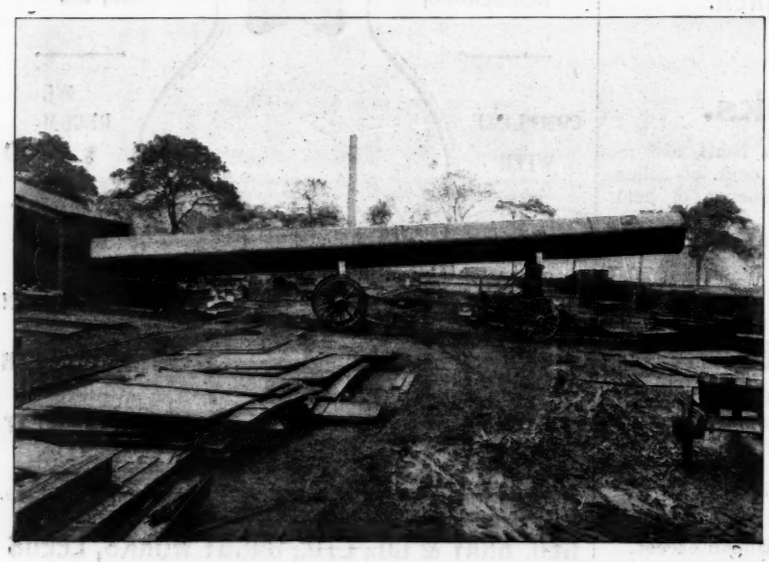

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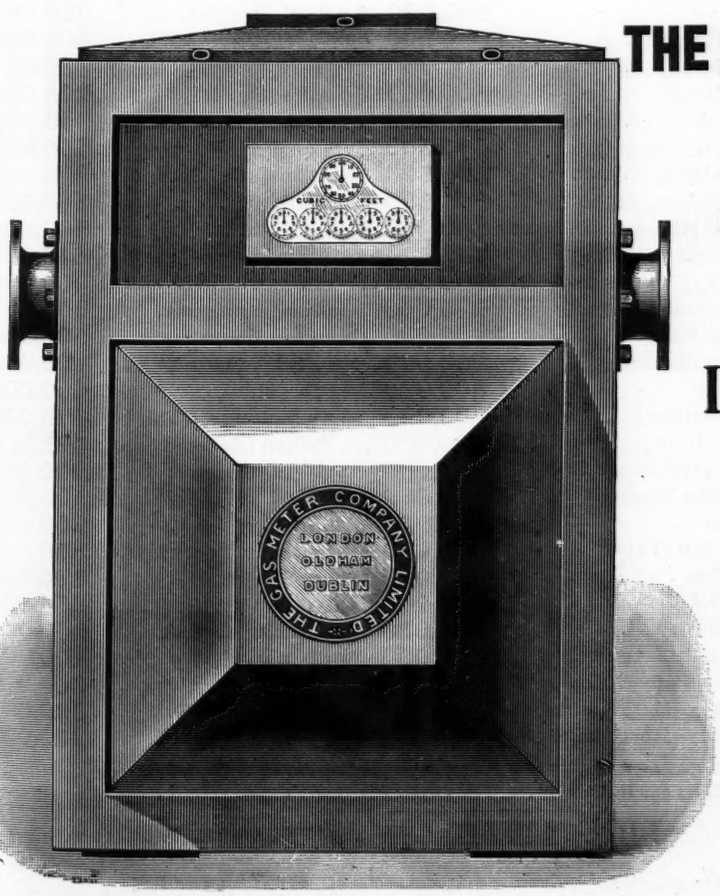

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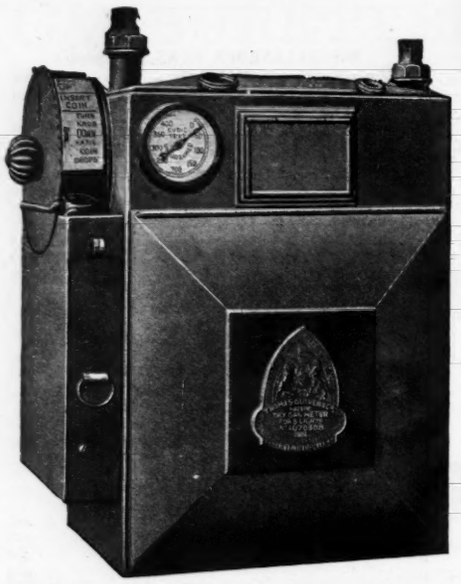

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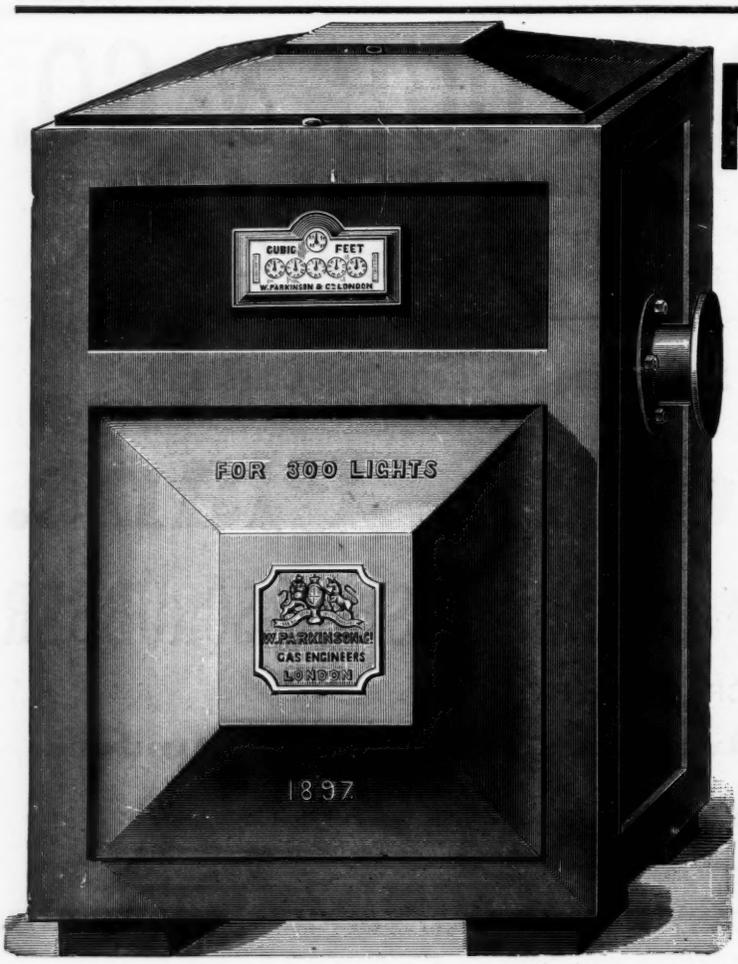

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EDITORIAL NOTES—GAS, &c.

The Board of Trade and the Gas-Testing Report.

THE parliamentary session is fast drawing to a close, and the holiday season has already commenced. Yet the Board of Trade have made no sign as to how they are prepared to give effect to the recommendations of their own Committee; nor does it seem likely that they will take any steps in furtherance of legislative enactment during the continuance in office of a Government the condition of which has been described as "moribund." The provisions of any Bill they might promote to carry out the recommendations referred to, are not likely to pass complete without being challenged by one side or the other; and the experience of the present session has shown the difficulty—not to say impossibility—under the existing circumstances, of getting any severely contested measure through Parliament. Why this should be so with so large a majority as the Government are still able to command, it is not our business to discuss. We are simply concerned with the fact that public business is, for the time being, in a state of partial paralysis. What, then, are the Companies to do? They must all desire to obtain at the earliest possible moment the relief held out to them by the recommendations. But how are they to proceed? One of them—the Commercial—will be obliged to obtain further legislation with regard to testing for illuminating power, in accordance with their Act of 1903; but they need not apply to Parliament until next year, nor, for the matter of that, need the Board of Trade take any earlier action so far as the Company named are specially concerned. This, however, would mean a delay of two years before any of the recommendations could be brought into operation, which would be scarcely fair to the Companies. The whole matter is ripe for settlement; and it ought to be settled forthwith.

Seeing that parliamentary enactment is necessary, the only way out of the difficulty seems to be for the Companies themselves to promote a Bill; and it is satisfactory to know, from the proceedings at the meeting last Friday of the Gaslight and Coke Company (commented upon elsewhere), that this is the feeling of the Companies themselves. There ought to be no insuperable barrier to their uniting for such an object, seeing that this is—in the main, at any rate—common to all. It is, moreover, conceivable that the Board of Trade would welcome the assistance of the Companies in the framing of a Bill which, if not in every particular identical with the recommendations of the Committee, would follow them so closely as to secure the support of the Department. There are, no doubt, one or two matters which will require careful consideration. One of these is the mode of testing for illuminating power. No substantial injustice is proposed in the recommendations, since the illuminating power of the gases supplied by the different Companies is to remain unaltered. It is possible, therefore, that the Companies supplying 14-candle gas may be indifferent to the alteration of terms which is in effect proposed; and certainly the consumers would not really be any worse off for this sop to the pedantry of Spring Gardens. There is, however, a strong feeling in the gas industry against the proposed return to a 5-feet rate for 14-candle illumination; it being greatly desired that there shall be evolved out of the present chaos a mode of testing that shall do equal justice to all qualities of common gas. This found expression in the unanimous protest of the Institution of Gas Engineers at their recent meeting against the suggested alteration; Mr. A. M. Paddon practically raised the question at the Gaslight and Coke Company's meeting; and it is to be hoped that the London Gas Companies will see their way to remain firm on this point. It is true, the matter is a little complicated by the contention of the Gaslight and Coke Company for a fixed height of flame in the chimney. This is no doubt correct in principle; but to try for it now would be to reopen the whole question, and to this it is scarcely likely the Board of Trade would agree.

There is another subject which might reasonably occupy the attention of the Companies in conference, and to which brief reference may therefore be made. This is the abolition of the Gas Referees. These gentlemen have long outstayed their welcome; they have for many years completely lost touch with the gas industry, and with the objects for which they were originally appointed; and their occupation will soon be gone. With the definition of the mode of testing, both for illuminating power and purity, in an Act of Parliament, whether promoted by the Board of Trade or by the Companies, the necessity for the retention of a body of well-paid chemical experts will have wholly disappeared—if, indeed, it ever existed. The due administration of such an Act would be the care of a Chief Gas Examiner. Gas Referees can no more be wanted in London than they are anywhere else within the confines of the United Kingdom. They have done nothing to assist the industry, but rather the reverse; and their disestablishment and disendowment is not likely to cost a single tear.

The Report and Accounts of the South Metropolitan Gas Company.

THE half-yearly reports and accounts of this Company are always of special interest, because they so transparently reveal the individuality and aspirations of the man over whose signature the reports appear. The document before us forms no exception to this statement; for it is full of information as to the position of the undertaking. It shows, in a practical and substantial manner, solicitude alike for the consumers, the shareholders, and the employees. For the consumers there is, as already announced, a further reduction of 1d. per 1000 cubic feet, which makes 3d. reduction, or (say) 11 per cent., since the commencement of the year. This brings down the price to the lowest figure ever reached in London—a circumstance which the Directors are quite justified in recording. It is equivalent to rather more than £25,000 per half year to the consumers, which is more by £3176 than the surplus at disposal. To many gas undertakers, this would be a reason for postponing a further reduction. But this Company have always pursued the bold course of making reductions at the earliest possible moment; and they have, so far, been rewarded by the result. For the shareholders there is a small, but welcome, addition to the dividend—part of that which could have been divided being carried to the reserve fund, which will thus be made up to the substantial sum of about £160,000, or almost the equivalent of a half-year's dividend on the ordinary stock. The insurance fund is at the same time brought up to "a round £100,000." The turn of the shareholders for another small increase of dividend is probably not far distant. To the employees there has been paid for the past twelve months, as co-partnership bonus, the large amount of £34,341 11s.; being 8¼ per cent. on the salaries and wages. For this, the Directors point out, there can be but two grounds of justification. It must be earned by good work, and the avoidance of waste of time and materials, and it must be rightly used by the recipients. They fully believe that the money has been earned by the better work of the great majority of the officers and workmen who take a real interest in the Company—the indifferent among them happily becoming fewer year by year. Moreover, the Directors "know that all but a small minority of the employees have "greatly improved their position; for nearly the whole of "their bonus has been saved and invested in the Company. "The employees now hold in the Company's stock at the "market value and on deposit with the Company at interest a "grand total of over £225,000; while, in addition, not a few "have purchased houses by means of their savings." The Directors further report, in this connection, and in accordance with the scheme for the election of Employee Directors, "that the three Employee Directors—one clerk and two "workmen—have continued to work to the entire satisfac-"tion of all their colleagues, and, as they believe, also to the "advantage of the Company."

The gradual—nay, the rapid—development of this Company into a huge co-partnership undertaking has probably no parallel in the history of industrial enterprise. It calls to

mind the period of unrest which followed the great upheaval of British labour in 1889; the tyranny of the Trade Unions, who, in their youthful pride, imagined themselves to be all-powerful; and the situation thus created, dominated by one indomitable will, not with a hand of iron, but endowed with that masculine sympathy which is characteristic of the genuine social reformer. Mr. George Livesey (he then was) realized that the old order had changed, and must give place to the new. He essayed a bold and, as some thought, a rash and dangerous experiment in profit-sharing. How well the experiment has succeeded, this and previous reports bear witness. Suspicion and indifference have given place to confidence, mutual esteem, and regard for the Company's interests; the Company, meanwhile, maintaining and increasing their lead as the most progressive gas undertaking in the world. "You are on the right lines, for sure," was the homely benediction pronounced upon the scheme by Mr. Andrew Carnegie; and these few and simple words really speak volumes.

The third paragraph of the report gives some interesting particulars as to the growth of the Company's business. Gas sales have risen by 4 per cent.; ordinary consumers, by 2 per cent.; and slot meter consumers, by 11⅓ per cent. The stoves in use have increased by 6 per cent. as regards ordinary, and by upwards of 15 per cent. as regards slot-meter consumers; showing that this department is in good hands. The coal bill is less by about £19,000, and there has been an increase of about half this amount in the receipts for coke, tar, and ammonia. But not the least interesting item of the paragraph in which these matters are referred to is the statement that the make and sale of gas per ton of coal carbonized have both increased by 200 cubic feet; the sale having now reached the hitherto unattainable figure of 10,530 cubic feet. This may be taken to indicate that, with the freedom which the Company now enjoy by reason of the reduction of their standard of illuminating power to 14 candles, finality in the carbonizing yield has not even yet been reached. The yield has shown a steady if gradual improvement since the Company set themselves to make 14-candle gas; and it seems probable that further improvement may be looked for as the result of bringing the carbonizing arrangements more and more into harmony with the new requirements. Meanwhile, the Chief Engineer—Mr. Charles Carpenter—and the officials and workmen who zealously second his efforts, are to be heartily congratulated on the large measure of success which they have already secured.

The report concludes with a comprehensive reference to what is justly described as an event of great importance to the gas industry, more particularly in London—namely, the appointment and report of the Departmental Committee of the Board of Trade. We have already commented at some length upon various features of this report, and shall have occasion to return to the subject. It may therefore suffice to say here that the Directors regard this, "on the whole," as satisfactory—as well they may. In its main features, which are the recommendations relating to sulphur purification, it is a distinct and personal triumph for the Chairman, who has long set his heart upon securing—not for his own Company only, but for the whole gas industry—that greater freedom "to work for the general good of their "customers and themselves" which it is anticipated will result. The Committee have not, it is true, made any pronouncement for or against reduction of illuminating power, and have shown themselves to be decidedly reactionary in their ideas as to testing for the latter. But these are not matters that need cause any uneasiness. To some, the prospect of marking down this Company's 14-candle gas as of only 13-candle illuminating power, may be a pleasing one; but while these good people pursue the shadow (which may, after all, prove elusive), the substance will remain with the Company and with their consumers.

The Half-Yearly Meeting of the Gaslight and Coke Company.

THERE was only a moderate attendance of shareholders at the Horseferry Road on Friday, and these were in a congratulatory mood. They had some reason to be; for the tale which the Governor had to tell was, on the whole, a satisfactory one. He went through the various figures in the statement of accounts in much the usual style; and he was congratulated upon his lucidity. He read out, with due emphasis and deliberation, a carefully prepared list of the recommendations of the Board of Trade Committee, and was complimented upon his masterly exposition; though it is safe to say that scarcely one in ten of his audience understood what he was talking about. Such is the power of a big balance on the right side! It works like a charm. Even Sir George Livesey caught the infection, and swelled the chorus of congratulation. It is not, however, to be supposed that the Governor's speech did not contain some most interesting matter. Quite the contrary. He told the meeting of the success which had already attended the recent adoption of the system of giving discounts to large consumers, and to users of gas for power purposes, and also of the growing favour with which the system is being regarded of mantle maintenance for a small quarterly charge per burner. The decision of the authorities to light Aldwych by incandescent gas in preference to electricity was noted with satisfaction; as was also the increasing use in the Company's district of incandescent gas for ordinary street lighting. There are still, however, it seems, some 17,000 lamps with flat-flame burners, or rather more than one-third of the entire number lighted by the Company. This seems to be a large proportion which it is to be hoped will rapidly diminish. It was also mentioned that the Company have commenced to supply gas-engines on the hire system. This is emphatically a step in the right direction; and if their powers are such as to enable them to supply dynamos on similar terms, the Company will have in their hands a most effective weapon for recovering the ground lost in consequence of the preference given to the electric light. It matters very little to a gas undertaking whether the gas is consumed directly or indirectly for the production of light; while it does matter to the consumer whether or not he gets the light of his choice at the lowest possible cost.

While still upon the subject of the accounts, the Governor uttered a note of warning which is well-timed. He remarked upon the unusual circumstance of low prices for coal having been, during the half year under review, concurrent with high prices for residuals. This state of things is not at all likely to continue, if, indeed, it has not already ceased to exist. Coke is of less value than it was, as is apparent from the accumulated stocks both of this Company and the South Metropolitan Company; and some of the tar products have become almost a drug in the market. An inquiry by one or two shareholders elicited the information that the reduction of 1d. per 1000 cubic feet recently made in the price of gas will not cause an increase in the dividend for the current half year, because, according to the Company's Act, such reduction must have been in operation throughout the whole year. Sir George Livesey pointed out that this defect in the original sliding-scale Acts had recently been remedied in several instances, by providing that the sliding-scale should operate half yearly; and a promise was made by the Governor that this apparent omission in recent legislation should be remedied when a further application to Parliament became necessary.

The most important part of the Governor's speech was, however, that relating to the recommendations of the Board of Trade Committee; and on the question of how these are to be given effect to, his suggestion, as an alternative to the Board of Trade promoting a Bill for the purpose, of combined action on the part of the three Metropolitan Gas Companies was hailed with an emphatic "Hear, hear" from Sir George Livesey, who later on promised the support of the other two Companies to the proposal. We deal with this aspect of the question in another article, which, it may be mentioned, was in type before the meeting. Our remarks therein upon the part of the recommendations which relates to the mode of testing for illuminating power are borne out by what was said at the meeting. The Governor supplied an omission in the report of the Directors by expressing regret at the proposal of the Committee that the 5 cubic feet rate of consumption should be adhered to—as well he might, having regard to his statement last February. This regret is general; moreover, it has been made abundantly clear that only by burning the gas so as to give a fixed height of flame in the chimney can equal justice be done to gases of varying composition. This is a point that might have had greater weight with the Committee had it been urged by all three Companies in combination; but the evidence seems to show that each Company fought very much for its own hand. Mr. A. M. Paddon made the useful suggestion that the principal Suburban Gas Companies should be invited

to a conference on the subject, seeing that their fortunes are, in a manner of speaking, linked with those of the three Metropolitan Gas Companies by reason of the not unusual provision that the mode of testing for illuminating power shall be that which is for the time being prescribed by the Gas Referees. The interests of these Companies are, however, fairly safe in the hands of the many representatives of them who are to be found on the Boards of the Metropolitan Companies. The latter, it is quite understood, will shortly meet in conference; it being on all sides desired that, to use Sir George Livesey's metaphor, the outworks having been taken, a combined effort should be made to carry the fort by storm. This highly satisfactory meeting—pregnant, it may be, with important results—was brought to a close after there had been accorded to the Secretary, Mr. Henry Rayner, a well-merited increase of salary, in fulfilment of the promise made a year ago.

The Crystal Palace District Gas Company's Report.

PARTICULAR interest attaches to the report and statement of accounts that the Directors of this Company will submit to their shareholders next Friday. These are the last which will be issued by the Crystal Palace District Gas Company, as such; the name of the Company having been changed (as and from the 1st inst.) to that of the "South "Suburban Gas Company." May they be as prosperous under the new name as they have been under the old, will be the wish of every one; and a better wish could not be given. The old familiar name disappears—to the regret of not a few; but the new one is indicative of a development that could not have been anticipated by the founders of the undertaking. When they marked out a wide "claim" for it in the fifties, the population was scanty, and there was but a remote possibility of the increase which has since taken place. For some years afterwards, there was little or no lighting worth the having beyond the immediate neighbourhood of the Crystal Palace; while that which gradually accrued to the Company in the more distant parts of their district involved a heavy (and for some time comparatively unremunerative) expenditure on mains. Nevertheless, the Company are now the lowest but one in capital outlay of all the Suburban Companies, as they are also the lowest but one in price of gas.

The half-yearly reports of this Company always bear a strong resemblance to those of the South Metropolitan Gas Company, for the reason, no doubt, that the same notable figure is at the head of both undertakings. The reports are always the most informing of all the Suburban Companies' reports; the position at the time of their writing being told with transparent frankness. In the present instance, the shareholders are reminded of the disappointing results that attended the efforts of the Directors to obtain parliamentary relief from what are popularly designated as the "sulphur restrictions" and from the necessity to use carburetted water gas. In view of this, and encouraged by the recent report of the Board of Trade Committee on Metropolitan Gas Testing, they have—greatly daring—taken the law into their own hands, and notified the consumers by circular (as already reported in the "JOURNAL") of their intention to abandon lime purification and the manufacture of water gas. What may have been the effect of this circular on the consumers will probably be told by the Chairman at the meeting, so far at any rate as may be gathered from such responses as have yet been received. There is not much likelihood of any serious objection on their part—especially seeing that the effect of the change is to reduce the price by 1d. per 1000 cubic feet. What may be the effect upon the Local Authorities has still to be seen; but, as the report says, if the consumers are satisfied, the Local Authorities can have no real ground of complaint.

Another matter of great moment referred to in the report is the proposal, for the purpose of making the co-partnership complete, to endow the employees with the power of electing two of their number to sit on the Board, in accordance with the Company's Act of Parliament which has just received the Royal Assent, and "as has been done by the "South Metropolitan Gas Company, with all-round satis-"faction, since 1898." This may be regarded as the crowning of the edifice, with regard to the co-partnership scheme; and it is well deserving of, and will doubtless receive, the cordial support of the shareholders.

Salaries and Honorariums.

No question of local administration appears just now to excite more attention than that of the salaries paid to public officials. In rare cases it is still possible to arouse a degree of interest over rival projects of sanitary improvement or water supply. A tramways scheme will, at least, receive attention from those whose residences or places of business are on the route by which the cars are to travel; and the respective merits of gas and electricity for public lighting may give rise to a discussion in the correspondence columns of the local newspapers. As a rule, however, the average citizen appears very content to have things managed for him. He may growl when he sees the rates going up; but with regard to the policy which produces higher rates, he is practically dumb. Much of this apathy may be due to the fact that most municipal schemes are carried out with borrowed money, and to the fallacious idea, which municipalities encourage, that the burden will be borne by posterity. It is different with salaries. They, at all events, have to come out of current revenue. Posterity has nothing to do with the remuneration given the Town Clerk, the Gas Engineer, or the Surveyor. A multitude of people who witness unmoved the addition of thousands of pounds to the municipal debt, are thus ready to take alarm if it should be proposed to add £25 or £50 a year to the salary of an official, however remarkable his ability, or whatever the value of the services he may be rendering to the community. Many men in the public service no doubt receive less reward than their abilities and labours merit, because of their desire to avoid provoking the hostility of the noisy multitude, who think that no man should receive a greater income than a small shopkeeper or a Labour leader. Some towns seem to serve mainly as nurseries for men in the municipal service; for they shed their officials almost as regularly as the trees shed their leaves. If any stay more than a few years, it is because they have been so unlucky as not to get a better post elsewhere. Whether they go or stay, they come to regard themselves as occupying only a temporary position. All corporations cannot, of course, pay alike. As a rule, the larger the town, the greater is the responsibility, and the more onerous are the duties which officials have to discharge. But whether large or small, it is pretty safe to say that no town benefits by niggardliness to its officials. Well-paid service is, generally speaking, good service. A man is more likely to give the best that is in him if he only feels that his best calls forth a responsive measure of appreciation from his employers.

In some quarters just now attention is being directed to the question of whether special services rendered by corporation officials should be recognized by an additional payment or honorarium. Cases arise in which officials are called upon to perform duties which are not strictly within the scope of their ordinary routine, and certainly were not contemplated at the time of their appointment. It may be the preparation of a set of plans, the oversight of some constructional work for another department, or the legal business arising out of new legislation, such as the Education Act. The work, whatever it may be, is something beyond that which was formerly discharged, and, on the face of it, should be remunerated. On the other hand, it is argued that the principle of engaging an official to give his whole time to the service of a corporation, and then paying him extra remuneration for certain duties, is illogical, and in many ways objectionable. It certainly is a means of provoking the hostility of the class of people who are always ready to cry out against the payment of any but the most miserable pittance to anyone. The dissatisfaction is not confined to one side. Cases have occurred in which men who have done special work on the understanding that they would receive special remuneration have failed to realize their expectation. On the whole, it would, no doubt, be far better that all officials should be paid salaries sufficiently high to remunerate them for all the work they may be called upon to perform. The abolition of honorariums in cases where they have hitherto been paid ought, however, in justice, to be accompanied by an increase of salaries commensurate with the new conditions.

An Interesting Arbitration

We report to-day the first portion of an arbitration dealing with the important subject of the interference with gas and water mains by the construction of electric tramways. It will be

noticed that the hearing took place more than twelve months ago; but no apology is needed for referring to it even after so long a time has elapsed. As a matter of fact, the arbitration was not such an one as would in the ordinary course of things be reported in the "JOURNAL;" hence its being passed over at the time. In view, however, of developments all over the country, the question involved has assumed considerable importance to those responsible for the administration of gas and water undertakings generally; and it is with the hope that it may prove of assistance to those who find themselves in similar difficulties that we have determined to publish an account of the proceedings. The case was one between the East London Water-Works Company and West Ham Gas Company and the West Ham Corporation; and it was based on section 30 of the Tramways Act of 1870, under which the Companies required the Corporation to alter and lower various mains and pipes, &c., in consequence of their intention to put down a tramway on a concrete foundation. The hearing lasted three days; and in all fifteen witnesses were called. These included, for the Water Company Mr. W. B. Bryan and Mr. E. M. Eaton, for the Gas Company Mr. John Clark and Mr. Corbet Woodall, and for the Corporation Mr. G. F. L. Foulger and Mr. H. E. Jones. The Companies contended that their mains ought to be moved laterally out of the tramway track, so as to provide proper and convenient access and that in certain cases a double pipe should be laid, one on each side of the tramway, in order to prevent any interference with the tramway if fresh consumers had to be added. The Corporation, on the other hand, argued that they had all along intended to concrete the whole of the streets in question, so that there was nothing to choose between lateral movement and leaving the pipes where they were in the very few cases in which they had to be lowered.

And the Result.

Though it is somewhat anticipating our report (the concluding portion will probably be published next week), it may be well to mention here the result of the arbitration, which was unfavourable to the Companies. This differed from the decision in the Ilford arbitration, which took place earlier, and in which the District Council were ordered to relay the Gas Company's mains for a distance of about 2½ miles, and bear the expenses of the hearing. Possibly, however, the Arbitrator (the Hon. Alfred Lyttelton, K.C., M.P.) in the West Ham case was guided to some extent by a promise made by Mr. Danckwerts on behalf of the Corporation to lower all gas and water mains which they might, in the course of the construction of the tramway, hereafter discover lying under the tramway track, to a depth of 2 feet from the surface of the roadway, in the event of such pipes not already being laid at that depth—it being distinctly understood that this undertaking was not to cast any obligation on the Corporation to excavate to any greater depth for the purpose of endeavouring to discover the pipes. As to what really influenced the decision, however, readers will have an opportunity of judging for themselves when they are able to study the case for the Corporation and the speeches of Counsel in our pages.

Gas Engineers and Contractor-Designed Work.

The resentment which has been shown from the ranks of engineering contractors to the affront—so regarded—put upon them by the President of the Institution of Gas Engineers (Mr. H. E. Jones) in the manner of his criticisms of contractor-designed work, has point given to it by a communication from an engineering firm, in which they enclose a sample of the methods at times employed by certain gas engineers in order to obtain particulars, plans, &c., from the supply of which there are long odds against the contractors securing any return. In this instance, the gas engineer who makes the inquiry is to all intents and purposes (in connection with the matter upon which he is writing) the Consulting Engineer; and yet he goes to contracting firms for information of the most commonplace type. This engineer has been consulted in connection with the construction of a new gas-works to have an output of 40 million cubic feet. Note that the gas engineer has been consulted; and he straightway commences operations by consulting someone else. The specialist in question asks for particulars of certain settings, with blue prints or tracings, showing self-sealing mouthpieces, ascension-pipes, hydraulic main, and all iron work. The only thing he himself volunteers in the way of information is that probably beds of sixes will best suit the size of works. Upon this, the inquirer after knowledge names half-a-dozen points on which he desires to be advised, the nature of which points are worth noting, more especially in view of the fact that he has been consulted. Here are the questions: "(1) What do you find the most popular size of retorts for such a works? (2) Maximum depth and other dimensions to be shown on tracing. (3) Guaranteed make per mouthpiece per twenty-four hours? (4) Guaranteed consumption of coke per ton of coal carbonized? (5) Guaranteed make of gas per ton of coal carbonized? (6) Approximate *entire* cost per mouthpiece of supplying all materials, including excavations and all ironwork complete ready for working, including erection."

A Position Forced upon Contractors.

Just observe the nature of these questions, and imagine all that they involve in labour in getting out the information asked for. To reply to them requires technical knowledge spread between the distance at one end of which is the experience of the drawing-office and at the other the experience of the practical gas manager; and for it the gas engineer applies to gas-works contractors, who, to answer his and such-like questions, must keep a staff of men with the necessary ability to deal with them. We are at one with Mr. Jones in thinking that the status of the gas engineer, speaking generally, needs raising; and that this ease in obtaining skilled advice, plans, and everything else from the offices of contractors does not promote the higher interests of the profession. But is this the fault of the contractors; and is it any reason why they should be "slated"? We opine not. While admitting that the system of contractors being "universal providers" in this regard is pernicious to the raising to a higher level of the profession of gas engineering, it must also be allowed that it is a system which has been forced upon them by circumstances that are clear to all who care to see them. Therefore, the contractors cannot be blamed. And when they get a "gas engineer" who has been "consulted" regarding the erection of new works coming to them with a list of questions such as those set out above (so soon after Mr. Jones's declamation on the subject), there is nothing very strange in them producing the extensive application as an illustration of what they have to be prepared to meet. Of course, specialities are so strong among gas engineering contractors now, that they are bound to get a large amount of correspondence from gas engineers in reference to them. That, however, is only part of their business. To inform a "gas engineer" who has been "consulted" on the matters referred to in the letter submitted to us, is going beyond what should be required of contractors, and therefore beyond their legitimate business.

The Search for the Rare Oxides.

Although without very much effect up to the present, the services Dr. T. Lamb Phipson, of Putney, has been rendering in stimulating the search for new sources of the now indispensable thorium deserve the thanks of the gas industry. He has communicated the results of his endeavours from time to time to the "Standard;" and we have directed attention to them as they were published. From them, we have learned that the valuable rare oxides required in the making of the gas-mantle exist, perhaps not in workable quantities, in many places—in the stones of far-away countries, and even in the kerbstones of our London streets. We must not despair, therefore, that Brazil, and, to a less extent, North Carolina and Australia, will always hold the monopoly of the material from which thorium can be readily obtained. Further hope is given, though readers must not go into ecstasies over it, in another communication from Dr. Phipson last week. A gentleman in Ceylon has seen one of the previous letters to our morning contemporary, and has kindly forwarded to the Doctor a small box of pebbles—not unlike the little flint pebbles common to our garden walks, but in many cases showing evidence of crystallization. They vary in size from that of a small pea to that of a hazel nut, and are mostly opaque, and of grey, yellow, and brownish tints. They are also remarkably heavy—about twice as heavy as flint. The Doctor

has carefully analyzed the pebbles, and has found that they contain the rare oxides—thoria, ceria, zirconia, and yttria—with titanic acid and columbic acid (in place of silica); and, as impurities, small quantities of oxide of iron, oxide of uranium, &c. It seems probable that these stones are found in streams flowing through some tea plantations near Balunga; and the interesting statement is made that these minerals can be obtained there in large quantities. This is perhaps the most hopeful communication the Doctor has yet made in regard to the special direction in which he has been instituting research. From the bowels of the earth we obtain the coal from which gas is produced; from some of the "dark" corners of the earth, the minerals are obtained by which the light-giving power of that gas is vastly increased. Strange, but true!

The Industrial Value of Ramie.

Those who have watched the progress of industrial development during the past few years cannot fail to have been struck with the number of new uses which the inventive genius of man has found for the products of the earth. It is not very many years ago that the principal use which could be found for coal tar was to put a preservative coat upon the palings of the back garden, or upon the water receptacle which, in the days before the introduction of the constant supply, was in many instances to be found located there. Since then the distiller has shown that there is a very much higher vocation for this residual product of gas manufacture. Take alpaca, again. Though from time immemorial the Indians have utilized the wool of the alpaca for making blankets or cloaks, it is only half-a-century since that Sir Titus Salt brought its value to the cognizance of the people of this country, and established the great works and the colony of workers surrounding them in the model village on the Aire which is named after him and the river. These thoughts were engendered by a perusal of the article bearing the same heading as this paragraph, which appears in another part of the "JOURNAL." A correspondent there shows us that the Asiatics and Chinese have for some time possessed in Ramie a material having many excellent qualities, which we in England are only just beginning to appreciate. It appears that, while having a lustre equal to silk, it is very much stronger than this or cotton, jute, hemp, or flax. It is its quality of toughness that has commended it for use in the manufacture of the fabric of incandescent mantles, for which it is said to be admirably suited—taking up the solutions much more evenly than cotton. If mantles made of Ramie are found to be more durable than those produced in the ordinary way, their more general use should be encouraged, seeing that the longer the mantle lasts the more satisfaction will be given to the consumer. It would tend to force home to him the conviction that incandescent gas is the cheapest and most effective system of illumination he can have. Whatever may be the other uses to which Ramie can be put, its utilization for the purpose just named is something for which gas suppliers should be thankful.

Concessions to Consumers.

The policy adopted by the Plymouth and Stonehouse Gas Company of encouraging friendly relations with the consumers, is to have some extension beyond the limit announced at the recent annual meeting. It was then stated that the Company proposed to undertake, free of charge, the work of keeping consumers' incandescent burners in order, and that, on application, a man would be sent to fix new mantles and otherwise attend to the lighting; the only cost to be borne by the consumers being that of the mantles. In formally announcing this concession, the Company now intimate that they will send a man to inspect new or other houses previous to occupation, to give an opinion as to the efficiency of the gas-fittings and pipes. This service is also to be rendered free of charge, and should prove of advantage to many consumers. In a majority of cases in Plymouth, the gas-fittings are the property of the tenants; but the pipes, when once fixed, of course remain in the houses from year to year. Though the brackets and pendants are liable to change with each change of tenant, it frequently happens that they are simply transferred from one house to another, or second-hand fittings are used. Whatever the circumstances, however, an inspection of the lighting arrangements ought to be attended by valuable results.

MR. WOODALL'S VALUATION IN THE RICKMANSWORTH ARBITRATION.

IN the "JOURNAL" for July 26, there was an Editorial Note, followed by an explanatory paragraph last week, dealing with the Rickmansworth gas-works purchase award and Mr. Corbet Woodall's valuation, founded on the abstract report of the proceedings at the arbitration which appeared in our columns on April 26. Unfortunately—owing to the necessarily condensed report in our pages—there has been a little misunderstanding which it is desirable to set right; and we are now enabled to do this, having seen the full shorthand notes of the proceedings.

The facts are as follows: The profit of £1295 that was taken in Mr. Woodall's valuation made no allowance for interest on the bank overdraft, nor for the mortgage debt interest, because, as Mr. Woodall explained to the Court, in the opinion of the Company's Counsel, the course to be preferred was to hand over the business to the purchasers free from liabilities; the Company discharging the debts out of the amount awarded. This course being adopted, the purchasers would not be liable for the interest, as the debts would have been extinguished. Had the valuation deducted the interest and at the same time allowed for the repayment of the principal, the purchasers (and not the vendors) would, Mr. Woodall points out, have been credited twice over with the amount of the debts.

From this explanation, it is clear that Mr. Woodall's original valuation did not contemplate that the Company's debts would be paid twice over by the Council, as would appear from our abstract report; and we regret that insufficient information misled us into making the statement to which Mr. Woodall has called attention.

THE PARLIAMENTARY SESSION.

THE present session of Parliament is drawing to a close—in fact, the Prime Minister announced last Tuesday that he saw no reason why the prorogation should not take place at the end of the present week, or shortly afterwards. At the same time, the Government are far from the end of their legislative programme; and, therefore, there is to be the usual "massacre of the innocents." The programme for the session included a large number of Bills dealing with a promiscuous set of subjects that are a long way from incorporation on the pages of the nation's statute-book. A few of a more or less non-controversial nature are going to be carried before the session ends; a greater number—embracing the Port of London Bill, the Valuation Bill, and the Local Authorities Treasury Powers—are to be dropped; and a few others (the Alkali Works Bill and the Light Railways Bill among them) are measures placed by Mr. Balfour in the category of "doubtfuls."

But there is another class of Bills which, as the leader of the Opposition has recently pointed out, sometimes hold surprises for the Commons at this period of the session. These are the measures that may be dropped down upon the Lower House from above—not from heaven, but from the House of Lords. There is one which at present is resting in the Lords; and in which the gas industry is peculiarly concerned. That is the Board of Trade Electricity Supply Bill, the provisions as well as the objects of which do not commend themselves to us as being in the best interests of the ratepayers and of the gas industry. This is a matter which has been thoroughly discussed in recent issues. The Bill, however, is still in the Lords, and it has yet to pass through the Commons; so that there is small chance of it becoming an Act, and being immediately brought into operation. If this is so, the delay may be made useful. The portentous character of the Bill is unknown to the general ratepayers; they have no knowledge as to how far by it their veto in the matter of large electrical adventure is being assailed by the proposal of the Board of Trade that Parliament shall allow them greater scope in the matter of dispensing powers among local authorities. Of course, the Bill applies to companies as well as to local governing bodies; but the difference is as between private and public financial responsibility and risk, and as between the visiting of the results of the sin of imprudent speculation upon those who knowingly enter into it and those who have been innocent of all such knowledge. If, therefore, the Bill is to be hung up until next session, preparatory measures should be taken in good time to seriously contest this substitution of Parliament by a Government Department until proper provision is made for maintaining the voice of the people in these local matters.

The close of the session is upon us; and, whatever may have been its fruits in regard to national affairs, it has been abnormally uninteresting for the gas industry. There have been no private measures of first importance discussed; and yet we do not look upon the session as being altogether barren of gratifying features. There are a few adherents of high illuminating power gas who cling tenaciously to their tenets; and they have a perfect right to do so, though they may, in angry and not dispassioned moments,

think that those who hold different opinions are suffering from cerebral aberration. Notwithstanding, one of the tendencies of the past session has clearly been towards lower illuminating power. Parliament has not by any means discouraged the movement; and several gas undertakings take with them from this session the right to supply 14-candle gas. The spirit of the Bermondsey clause has, after a long and patient inquiry by the Duke of Northumberland's Committee, been endorsed; and a somewhat modified and extended form of the clause has been countenanced in a manner which betokens its favourable consideration and almost general application, when desired, in future sessions. Protection against, and compensation for, damage by electrolysis has, up to a certain point, been recognized as just; but there is much yet to be done before we can hope for the final acceptance of the principle over which such good fight has been made by gas companies and not a few authorities. However uncompromising the attitude of the Lord Chairman of Committees may be, there must be no cessation of hostilities until the goal is reached. It is a simple matter of justice that pipe owners ask for; and year by year the danger grows. The electricity distribution projects of to-day are of an immensity undreamed of eleven years ago, when the Board of Trade regulations were framed on merely a rudimentary knowledge of these things. Therefore, nothing must be lost by the discouragement of the session, nor must gas undertakers give way in the present to any idle disregard of this matter. As sure as the night follows the day, so will the future—if the signs are not deceptive—see a depreciation of underground distribution systems at a rate without its equal in any previous time.

Concerning Private Gas Bills, there have not been any conspicuous schemes before Parliament. The only one that would have been out of the ordinary was that of the Crystal Palace District Gas Company, the leading points of which, however, were set on one side in view of the Departmental Committee's inquiry. That is not the only influence that the inquiry has had upon the legislative work of the session. There are certain promoters of Gas Bills who have been allowed to reduce the illuminating power of their gas, subject to their conditions of testing hereafter conforming with the recommendations of the Committee. The one bearing upon this matter has not about it the commending feature of perspicuity; but it looks as though those who, subject to the condition mentioned, have been authorized by Parliament this session to supply 14-candle gas will find themselves in a position that may require to be defined a little more closely. One thing is certain, that the report of the Committee in this and other respects will have an important bearing upon future legislation.

ELECTRIC LIGHTING MEMORANDA.

The Board of Trade and Parliament—Unproductive Concerns—Salaries of Municipal Electrical Engineers.

THE sooner Parliament set the Board of Trade in their proper position the better. Their high-handed procedure upon matters electrical is not only unreasonable, but is getting unbearable; and this must lead sooner or later to friction between them and Parliament. If the session had not so far advanced, an opportunity has arisen for a decision as to whether Parliament should dominate the Board or the Board dominate Parliament. It is only a few weeks since that we commented upon the attempt of the Clyde Valley Electric Power Company to evade the obligations imposed upon them by the Act under which they carry on their operations. That Act gives to the Local Authorities concerned protection in the matter of electrolysis; but this session the Power Company promoted a batch of Provisional Orders for lighting by electricity certain towns and districts; and they contended that the protection afforded to pipe owners by their previous Act ought not to be perpetuated in these Lighting Orders. The Board of Trade agreed. A Committee of the House of Commons, however, were of a contrary opinion; and the safeguarding clauses of the original Act were made by them to apply to these Orders. When this decision came to the ears of the Board of Trade, they (so the report runs) "declined to allow the Bill to proceed." Declined! Things are certainly coming to a pretty pass. Negotiation had not the effect of changing the Board's attitude, and an interview between representatives of the promoters of the Orders, the Local Authorities, and the Board of Trade ended in an equally abortive manner. As a result, there have been some open criticisms, of anything but a quiet nature, as to the presumption of a Government Department over-riding a Select Committee's decision. In the Lobby there has been some talk of endeavouring to raise the matter in the House as a question of privilege; but the session is too near the end, and there is so much business to be disposed of, that it has been determined to place the Confirmation Bill on the shelf until next session. We shall have to find a name for the peculiar complaint from which the Board are suffering in connection with electrical legislation.

Looking down the accounts of the electricity undertakings now being published in the electrical press, a single issue presents some examples which cannot have any exhilarating effect on the ratepayers of the boroughs or towns concerned, especially when they recall the glowing prospects held out to them when the question of entering upon the electricity supply business was first introduced to their notice. The predictions as to profits have, in many cases, after many years, proved to be either exaggerated or altogether visionary. Take the West Ham undertaking. It has just emerged from another year's trading, with, after meeting interest and instalments of loans, an expenditure exceeding income by £3788. Fortunately, there was a credit balance of £1689 from the previous year; but, even then, there is a deficiency of £2099 to be made good from the general district rate. This is not the only thing for the ratepayers to digest. For two years, the Electric Lighting Committee have set aside annually £1000 to reserve. On this occasion, the Borough Accountant cannot, in view of the state of the accounts, advise that this course should be taken; but he is of opinion that £1000 should be regarded as a minimum, "in view of the fact that the capital expenditure in equipment, which will probably become inoperative before the expiration of the loan, amounts to nearly £150,000." This is a brilliant prospect. The additional expenditure, as compared with the cost, and the interest and sinking fund payments on unremunerative capital have been heavy during the past year. It is, however, expected that a considerable increase in supply will take place during the next financial year; but, as the capital charges will also be much heavier, the increased revenue will, it is anticipated, be little more than sufficient to meet the additional charges. The Southwark Electricity Department have only made a surplus of £224. Wimbledon, however, stands out well from the surrounding disappointment. The department has obtained sufficient profit for all purposes, and places £1000 to reserve, with £1940 in hand to go forward. But, again, we have the Tonbridge Electricity Department showing a deficit of £1280. Oldham has been unable to make both ends meet out of the gross profit of £13,002, seeing that interest required £7683 and sinking fund instalment £5906. Luckily for the ratepayers, the department brought forward £6161. But they have allocated nearly all this to various funds, retaining in hand only £389. If the current year is not a better one, the ratepayers will have to dip into their pockets to make up a shortage, or there will be nothing to place to the funds in question. Grimsby has also a deficit of £581. As stated, these illustrations are taken from a single number of an electrical contemporary; and they alone—particularly the West Ham one—make a very fair case for the Northumberland clause. "Profits" from enterprise are supposed to be material things; but the profits of many electrical undertakings are still the phantasms that they were before the works were ever brought into existence. The marvel is that notices of applications for Electric Lighting Provisional Orders continue to come in merrily from Local Authorities, who have not all districts like Edinburgh, Glasgow, and other big centres from which to draw custom.

It is common knowledge that the majority of engineers who have had experience of both municipal and company service prefer, for several reasons, the latter. It is a conspicuous fact that, generally speaking, there is all round a better consideration under companies for the advancement and general comfort of the officials, and they are not subject to the pettifogging treatment and annoyance that many men serving on the Committees of Local Authorities think it their duty to impose on the officials, whose training and social position are not a sufficient shield against the vulgarities of those who are their inferiors in these respects. Electrical engineers are feeling this, judging from the occasional peeps which we get through the electrical papers at the tendency of things at the present time. Only last week there was published a letter from a "Chief Assistant," in which he complains that the Municipal Electrical Association are not fulfilling their fundamental objects—viz., binding together municipal engineers for mutual help, and assisting in their social advancement. The writer admits the value of the papers that the Association have been the means of publishing; but he asks what the organization have done for the social advancement of the members. Since the inauguration of the Association, the salaries paid in every department of the profession have gone lower and lower; and no notice is taken of the flagrant cases of grinding down of professional remuneration that come to light. While this writer does not wish the Association to fall to the level of a Workman's Union, he thinks that they might impress on Committees the fact that "the men they are engaging are miles above the workmen who are under their direction and worthy of their pay." Unless the Association take up the protest, our experience is that it will have little or no effect. Corporation Committees are not moved to anything but laughter at the indignation of a single individual in this way. The protest, however, shows that the treatment served out to many gas engineers of local authorities is that meted out to other officials. There is perhaps a little consolation in knowing that something like uniformity exists.

Mr. Ewing's Paper at the North British Meeting.—Mr. Ewing asks us to correct a slight error he made in the figures in the table at the bottom of the first column of p. 323 in the last issue of the "JOURNAL." The total cost of the retort-bench and the De Brouwer projector should have been given as £3804 (not £3408). Then the table will read: Cost of carbonizing 36,500 tons of coal, at 1s. per ton, £1825; annual interest on £3804, at 3½ per cent., £134; and sinking fund for redemption of £3804 in 15 years, £254—making a total of £2213 instead of £2171.

THE TESTING COMMITTEE AND A CALORIFIC POWER TEST.

It must long before now have been patent to all interested in the march of progress in the gas industry that the time was not far distant when the calorific power of gas would be the supreme quality, that the illuminating power would decline into comparative insignificance, and that sooner or later a test for the former would be applied either in substitution of that for the latter or to run collaterally with it. The hand-writing has been on the wall for years; and by many it has not passed unheeded. It has time after time been noticed in Parliamentary Committee Rooms, and in the halls of technical debate. Men of science, gas engineers, chemists, and examiners have turned their attention to it, and have recognized its import. But as yet little has been systematically done; only the fringe of a large and in many respects unknown subject has been touched, and we are—notwithstanding the warning—still floundering about in a sea of uncertainty. But, why? Simply because there has been no competent authority possessing the confidence of those who make gas law and of those who have to comply with that law, who have regarded it as their business to undertake the research necessary to show us what we may look and hope for, and what measure of confidence can be placed in a test for the thermal power of gas, in view of the fact that the slender amount of evidence available appears to assure us that, according to the constitution of the gas, the calorific power varies rather considerably as between works and works.

That is the position—nothing very tangible before us, but much that is discordant. Yet we are to-day within measurable distance of a calorific test being put upon the Metropolitan Gas Companies, and it will not, and cannot, be confined to London. Parliament is, through the Board of Trade, instructed by a very competent tribunal "that official tests of the calorific power of the gas supplied by each Company should be made, recorded, and notified." This is the recommendation, the result of careful consideration of the question whether the increasing proportion in which gas is being used for heating, as compared with illuminating power, renders it desirable that any fundamental alteration of the existing testing requirements should be made—such as the combination of a standard for calorific power with one for illuminating power, or the abolition of the standard for illuminating power and the substitution of a calorimetric standard. On the evidence before them, the Committee could not nail down hard and fast an opinion as to the desirability. But their recommendation will be a sufficient beacon for most intelligent men. At the same time, the recommendation must be associated with the fourth paragraph of their report, from which it will be seen that they do not advise that these official tests should be for the purposes of forfeitures. But this is only the beginning. The tests first; and when further knowledge is obtained, then will come the prescription of a standard that will carry the penalties. This, without doubt, will be the sequence of events. The Committee themselves suggest as much when they say: "The results of these tests should be recorded, and will form a valuable guide for future action." These words "future action" are as full of significance for Provincial undertakings as for the Metropolitan ones, and those which, through their suburban situation and absence of coincidence of areas of jurisdiction and supply, come directly or indirectly under the influence of the gas policy of the authorities in London.

The recommendation of the Committee is, in all probability, the introduction to a new system of statutory testing under which every gas undertaking will, in due time, be brought. To all, therefore, the character of the evidence upon which the Committee have founded the recommendation must be of importance and interest; and it will, for this reason alone, be useful to indicate it by collocating the points, without reference to the numerous other matters that constitute the hundreds of printed pages of the minutes of evidence. In doing this, it will be shown very distinctly how much has yet to be done and learnt before gas undertakings can consent (if they are allowed a voice in the matter) to be placed under a calorific power test with penalty attached.

So much was said at various stages of the inquiry that the trouble is to know the best place to start. But whether the best or not, choice has fallen upon the opinion that Professor Vivian B. Lewes put before the Committee "that London should have a uniform gas supply of 12-candle power coal gas, having a heating value of not less than 500 British thermal units gross." From this point, we will weave the thread of the evidence. It is the deliberate view of Professor Lewes—and everybody in the gas industry knows how extensive have been his experiments on this matter of the calorific power of gas—that there can be no doubt or uncertainty in obtaining the 500 British thermal units, if the gas is made from coal. The object of putting this limit to a calorific standard is to prevent too large a proportion of water gas being used. Those who have not marked it before should do so now from the explanation laid before the Committee by the Professor, that the heating power of coal gas is very largely dependent on the proportion of methane (or marsh gas) in it; and it really does not matter whether one has got a poor or a rich coal gas—there is very little variation in the quantity of methane, because, as the retorts are heated up, the things that really break up are the unsaturated hydrocarbons. The methane will stand a much higher temperature. Therefore, the reduction in methane is not so great as in the other hydrocarbons; and so the candle power comes down much more quickly than the heating power. A coal gas of 16-candle power is ascribed by the industry's Professor as having a heating power of 620 British thermal units; and the heating power of all the 12-candle gases that he has tested from time to time has run to about 520 units. Of course, there is great variation in the thermal units according to the kind of coal used. Midland coal will give a different calorific effect per candle power from Durham or Newcastle coal; but, taking it all round, 500 units is, in Professor Lewes's opinion, a perfectly safe limit to fix.

In the figures which will be given, the terms "gross" and "net" occur rather frequently; and the distinction between the two is this, as described to the Committee by the same authority. If one takes the gas and burns it, and then condenses the water that is produced, so as to get the latent heat in the steam, this is called "gross;" if the steam is allowed to escape as steam, that is "net." But the determination is more accurate and easy for "gross" than "net" values. Therefore, in providing a calorific test, it would be better if the test were a gross rather than a net one, because in the net test one has to depend on the amount of water condensed from the products of combustion as a factor to deduct from the gross result; and this varies a little. In the gross, exact uniformity can be obtained. It may be useful to note that, according to Professor Boys, the net value is about 10 per cent. less than the gross.

As the minutes are dipped into, one finds an almost confusing mass of statements as to the comparative thermal value of coal gas and carburetted water gas and of 16-candle power gas and gas of lower powers. The calorific value of carburetted water gas, it is well known, varies according to the degree of enrichment; pure water gas coming very low in the scale of calorific values—according to Professor Lewes, to 320 units gross, and 280 units net. It is in Professor Vernon Boys' evidence that we get the first comparison between carburetted water gas and coal gas; and his figures, bearing the stamp of the authority of a Gas Referee, have very naturally been laid hold of as being of the highest importance to the cause of the lower grade illuminating power coal gas. During the past year or two, tests have been made at the office of the Referees and in South London, which (so Professor Boys first said, speaking from memory) have shown that the South Metropolitan coal gas is some 5 calories to the cubic foot better than that of the mixed and higher candle power gas of the Gaslight and Coke Company. The figures he originally gave were roughly about 150 calories for the South Metropolitan gas, and 145 for that of the Gaslight and Coke Company. A calorie is equal to 3·968 Board of Trade units. The fifteenth sitting of the Committee saw Professor Boys back again, asking permission to correct his evidence on this point. Glancing over his notes subsequent to making the foregoing statement, he had found that the value of 145 calories for the Gaslight and Coke Company was the result of only a single observation; and the average was well above that. He presented the results of further tests made by himself of the calorific value of the gases of the three London Companies, and gave the reading of the illuminating power just before the observations for the former were made. For the South Metropolitan gas (14·65 candles), the thermal value was 610·4 units gross; for the Commercial gas (15·22 candles) 616·2 units gross; and for the Gaslight and Coke Company gas (15·51 candles) 616·2 units gross. There are two things to be noticed about these new tests—the first is that the South Metropolitan Gas Company's coal gas, though the lowest in illuminating power, was in close touch with the calorific value of the higher candle power gas of the other two Companies, which, in both instances, contained carburetted water gas. The second point is that, though the gas of the Gaslight and Coke Company was slightly higher in illuminating power than that of the Commercial Gas Company, the two were on an exact equality in the matter of calorific power. (These later tests were the subject of comment in the editorial columns last week.) In considering the results of tests that were put forward by the Gaslight and Coke Company and others at a subsequent stage of the proceedings, it is well to note that, though the calorific value of gas does rise and fall with the illuminating power, the change of calorific power is, Professor Boys gives his authority for saying, very much less than the change in illuminating power.

And very much the same thing is asserted by Professor Lewes when he says that it is a pity to insist on a high standard of illuminating value when one finds that where it is obtained by enrichment, that enrichment does not impart the same increase in calorific value as it gives in illuminating value. Then, in Mr. Corbet Woodall's evidence we get established something like a ratio as between carburetted water gas and coal gas, from the experience of the Gaslight and Coke Company. About 20-candle carburetted water gas is equal to the gas made from coal. From Mr. G. C. Trewby's evidence, it is seen that the coal gas has an illuminating power of 15½ candles, and the calorific power is equal to 570 net British thermal units; while the carburetted water gas, with an illuminating power of about 19 candles, has a calorific power equal to 555 net units, so that the carburetted water gas, according to the Company's own observations, must have at least an excess illuminating power of 3½ candles to be equal—or nearly so—in calorific power with coal gas of 15½-candle power. The mixture of the two in the proportion of one-third carburetted water gas and two-thirds coal gas,

has a heating value of 565 units net. If the illuminating power is reduced so as to give 14½-candles—that is to say, the carburetted water gas and the coal gas mixed in the same proportions—Mr. Trewby states that the calorific power would be lowered to about 528 candles. It will be remarked that this approximates the value given by Professor Lewes for 12-candle coal gas; and if we turn to Mr. Charles Carpenter's evidence of several sittings later, it is found that, from a great many tests of the 14-candle *coal* gas now supplied by the South Metropolitan Company, an average of 595 units gross has been obtained. It is a pity, in view of what Professor Lewes tells us as to the determination of the gross value being more accurate, that the figures are not all stated in the same terms. Further ambiguity is imported by the figures given by Dr. Percy F. Frankland, for we cannot trace whether he is dealing with pure coal gas or a mixture of carburetted water gas and coal gas, seeing that the calorific power per cubic foot for 16·3-candle gas is stated to be 628 units gross and 567 units net, and for 14·4-candle gas 582 units gross and 529 units net. Later on, however, he endorses what has previously been stated, that a pure coal gas has a different heating power for a given illuminating power from what a mixture of coal gas with carburetted water gas would have for the same illuminating power.

As bearing upon this aspect of the case, Mr. H. E. Jones laid bare his view that the higher illuminating power gas has the higher heating power, but not so much higher as its increased cost of manufacture would represent. The two or three candles higher illuminating power cost a great deal more than they are worth from the heating point of view; and, further on in his evidence, he confirms, from his own investigations, that the diminution in calorific power is not in the same ratio as a diminution of candle power. Sir George Livesey had little to say on this subject; but one thing that he did impress upon the Committee was that, where mixtures of carburetted water gas and coal gas were distributed, great care should be taken in keeping them uniform, as variations—the experience of the Crystal Palace District Gas Company proved to him—led to a great disturbance of the efficiency of gas fires and stoves, and to complaints. Of course, the County Council witnesses—Dr. Frankland, Mr. Isaac Carr, and Mr. C. R. Bellamy—were all in favour of the higher illuminating power gas from the point of view of thermal efficiency; and in this they agreed with the witnesses from the Gaslight and Coke Company. Dr. Frankland's figures have already been stated. Between a 15 and a 13 candle gas, Mr. Carr's tests disclose a falling off of 15·4 per cent. in the calorific value. An ultraist was found in this matter in the person of Mr. Bellamy, who, persisting in calling the supply of the South Metropolitan Company 13-candle gas, kindly allowed it a yield of 560 units per cubic foot; while to the 20-candle gas of Liverpool—mixed carburetted water gas and coal gas—he gave a value of 712 units. By an elaborate calculation, he essayed to prove that the 20-candle power gas was the cheaper to the consumer. Will anyone marvel, after these divergent observations of different experts, that the Committee concluded that continuous research is needed before a standard of calorific quality is imposed, with testings carrying a penalty for default.

With all the evidence on this matter was intermingled a vast amount of opinion and experience of various observers upon the effect of the heating value of gas on the light emitted by the incandescent mantle. The view that a lowering of heating power affects to a serious extent the light given by the mantle, is described by Professor Lewes as being largely due to a confusion of ideas, as there is very little doubt that it is flame temperature and not the calorific value of the gas which governs the light obtainable from an incandescent mantle. "As is well known," he remarks, "the flame temperature given by water gas, which has only 320 British thermal units, gross thermal value, is greater than the flame temperature of coal gas of double that calorific value. With proper adjustment, I have obtained just as high an illuminating value from a Welsbach mantle with water gas as from coal gas; so that it is evident that the difference of 100 British thermal units is practically negligible as regards its lighting effect when used with mantles." Mr. Corbet Woodall combats this statement, describing it as a very seductive hypothesis; but he cannot accept it as correct. While it is true that the incandescent effect in a mantle depends upon flame temperature, it is, he holds, equally dependent upon the calorific power. "Assuming the flame temperature to remain constant, the amount of light obtained from a given volume of gas is proportional to its calorific power. If Professor Lewes obtained as high an illuminating value with water gas as with the same volume of coal gas, it must have been a question of the burner." It is also found (if we understand him correctly) that Mr. Woodall maintains that, in burning 14-candle gas and 16-candle gas in incandescent burners adapted to them, the increase in illuminating power with the latter is rather more than the proportionate increase in the candle power of the gases; but he admits that with water gas, the quantity used, to get the same effect as with coal gas, "would necessarily have to be much larger," because its calorific value is lower. It may be taken that Mr. Trewby is speaking of mixed carburetted water gas and coal gas when he states that, with reference to Welsbach burners, the difference in the calorific intensity between 16½ and 14½ candle gas is found by experiment to be about 10 per cent. "This would mean that to obtain the same light, the consumer would have to use 1100 cubic feet of 14½-candle gas, as against 1000 cubic feet of 16½-candle gas; and this would cost him 3⅛d. more." Mr. Trewby, of course, was working this out on the fraction of a penny saving his Company could effect on their 3s. price at the present time by reducing the illuminating power. His calculation, however, does not do justice to the charges of the two other London Companies for their 14-candle power gas. That, he may well say, is not his business. Granted; but the point may appropriately be made here. In conjunction with it, reference should be made to a table compiled by Mr. H. E. Jones, which shows that some representative 14-candle gas companies have reduced their prices since 1880 by percentages ranging between 38 to 16; while the Gaslight and Coke Company have only made a reduction of 5 per cent.—up to the time of the sittings of the Committee. These figures rather swamp Mr. Trewby's 10 per cent. increased consumption. On the other hand, however, Mr. Carr calculates a loss of efficiency of 18·3 per cent. between 15 and 13 candle gas consumed in incandescent burners.

Now having reviewed the evidence on this question of calorific power, and presented readers with the medley of opinion and observation laid before the Committee, it may be asked, Who would care, on such testimony, to draw from it a definite prescription as to the calorific value a gas should possess, having regard to the price, to give the consumer the best return for his money? Professor Lewes is the only witness who speaks distinctly on the matter; and, without hesitation, he defined, as suitable for present-day uses, a 12-candle power gas having a calorific value of not less than 500 units. Sir George Livesey exercises caution. "We do not know yet," he remarks, "what would be the most economical conditions for the gas—whether 500, 400, or 350 British thermal units. We want to find out." Professor Lewes says the calorific test is the proper one for those who use gas by the incandescent mantle, for power, and such-like purposes; and, in a confidential moment, he said this to the Committee: "If you want my private view, I say abolish testing for illuminating power entirely, and replace it by the calorimeter." Mr. H. E. Jones did not go quite so far, but he "looks forward" to the time when tests for illuminating power will be abolished altogether, and be replaced, perhaps, by a test for calorific power. Such a test would not harmonize well with existing legislation, but that it will eventually come, he is satisfied. The County Council have already shown their hand in this matter. They would not be content with the substitution of one test for another. Dr. Clowes said most emphatically: "The County Council distinctly wish that there should be a measurement of calorific power *as well as of illuminating power*." "We think it would be of importance and interest to the consumers to know what is the heating power of their gas." Really! Ask a thousand consumers in a district what the standard illuminating power of the gas supplied to them is; and the bulk of them will politely request you to ask them the next. Talk to them of "calories," "calorific power," "British thermal units;" and they will inquire whether you are talking Dutch. Dr. Frankland also thought that the calorific test should be supplementary to the illuminating power test; but Lord Rayleigh could not pin him down to an expression of opinion as to whether a calorific or illuminating power test would be preferable. He accused the witness of being "rather half-hearted" over the matter; and previously his Lordship had told Dr. Clowes pretty plainly that he—or the Council—appeared to be in favour of piling up obligations on the Companies. This seems to indicate that the County Council's well simulated solicitude for the consumers was recognized by the Committee as being nothing more than a blind to their notorious hostility to the Companies. However, Mr. Carpenter was prepared to agree to calorific tests being made so long as no penalty attached until the Companies could see exactly where they were. There was not the same heartiness displayed by Dr. Clowes over the tests being made when next the subject was broached to him. As the examiners are only appointed for specific duties, there might be, he explained, some difficulty; but he declared that personally he should like to see such tests made and recorded, and would report to the Council accordingly. Speaking for the Gas Referees, Professor A. G. Vernon Harcourt agreed with the Committee as to the desirability of having regular tests made.

In conclusion, there is one thing that more than all else will strike readers after considering this evidence. It is that, before gas undertakings can agree upon anything in regard to a calorific test, there must be a clearing of all doubt from the road, and this can only be done by time being allowed for experiment. The Committee also recognized this; and it cannot be expressed better than was done by Sir George Livesey, when he said: "We want freedom to make experiments—to work down in regard to the illuminating power; and it must be done gradually. The late Mr. Mundella once said: 'The unfortunate thing about this country is that we cannot make experiments. We pass an Act for the whole country; but we cannot make experiments.'" The Committee advise that there shall be an experimental period in this matter of calorific power.

The handwriting on the wall, as the result of this inquiry, stands out in stronger relief.

Reduction in Price by the Commercial Gas Company.—The Directors of the Commercial Gas Company announce a reduction from 2s. 6d. to 2s. 5d. per 1000 cubic feet in the price of gas, commencing from the taking of the Midsummer quarter indices.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 412.)

THE Stock Exchange was a long time before getting really into working order after the re-opening on Tuesday from the Bank Holiday break; and it was not to be wondered at, for the general position and outlook were anything but alluring. There were many absentees, and business throughout the week was remarkably quiet. Everything conspired to pull prices down. Dear money, anticipated flood of Exchequer Bonds, contraband conundrums, and poor railway traffics made a formidable array. Consols touched 87⅛ on Thursday; and other things shrank in sympathy. However, the long lane had a turning; and things took a decided turn for the better before the close, which was comparatively bright and cheerful. In the Money Market, there was some little fluctuation at times; but on the whole very firm rates prevailed for short loans, and discount, too, was stiffer. Transactions in the Gas Market were no better than moderate on the whole, although now and again business had a nice fillip which promised activity; but it could not stay. However, what it lacked in quantity it made up for in quality; the tendency being very good, perhaps even better than the prices marked would seem to indicate. There was only one line of weakness, and that was in the debenture stocks. This feature was, of course, wholly dissociated from the merits of gas as an investment, and was part and parcel of the intense depression which has afflicted all the gilt-edged securities. In the open stocks, there was a nice buoyant movement, which carried quotations up. Of the Gaslight and Coke issues, the ordinary was fairly busy, and very firm. Prices ranged from 95 to 96¼; and the quotation rose a point on Friday, on which day the Company had one of the most gratifying meetings they have held for years. Of the secured issues, the debenture fell a point. South Metropolitan was not active, but was strong, aided by favourable accounts for the half year. Prices ranged from 127 to 128; the quotation being 1 up. Nothing was marked in Commercials, except one deal in the debenture at a cheap figure. There were a few dealings in the Suburban and Provincial group, mostly in Brentford. The only change in London prices was a rise in Hastings; but in the local Exchange, Newcastle debenture advanced. Among the Continental Companies, Union showed renewed weakness, and had a fall of 5; but the others were firm. Of the remoter undertakings, San Paulo advanced. The Water Companies had little business in them; but they were affected by the shrinkage in gilt-edged stocks, and East London and Grand Junction receded.

The daily changes in Gas were: On Wednesday, South Metropolitan rose 1; but Union fell 2. On Friday, Hastings rose 2, San Paulo ½, and Gaslight ordinary 1; but ditto debenture fell 1, and Union 3.

GAS AND ELECTRICITY IN SOUTH AFRICA.

IN a recent number of "The Electrician," there is an interesting article by Mr. John Roberts, the Borough Electrical Engineer of Durban, on "Electrical Engineering in South Africa." For the most part, his communication is essentially an attempt to portray the local conditions of electric supply in South Africa; and there is one aspect of this that touches the gas industry. Mr. Roberts states, in language which shows his conviction as to its truth, that, while in England gas is a most formidable rival of electric lighting, in new countries electricity easily out-distances gas both in cost and efficiency; and the reason is that the former can be so much more easily and cheaply distributed by the use of overhead mains, throughout the great areas which usually obtain in colonial towns. In addition, he states that the cost of the production of electrical current may generally be taken at not more than twice English figures; but gas cannot be manufactured for less than three to five times English cost. Further, there is the fact that coal is somewhat poor, and the bye-products cannot be disposed of at payable prices. Therefore, he states, electricity is generally much more used in South African towns where central stations are in operation; and its scope would be immensely increased if heating and cooking by electricity were a commercial success. Domestic cooking in South Africa is so troublesome, on account of the hot climate and the ever-present and world-wide domestic servant difficulty, that Mr. Roberts believes a supply of gas distributed for this purpose only would pay were it not for the cost of distribution.

All this is interesting; but we must join issue with the writer, even on the small amount of guiding information that we have at hand, upon his assertion that "electricity easily out-distances gas both in cost and efficiency." We should like to know whether he bases his comparison on flat-flame or incandescent gas-burners. If the former, we can well understand its truth; if the latter, we must dispute it, in view of Mr. Roberts's succeeding statement that the production of electrical current costs twice as much in South Africa as in England, while gas costs three to five times more. Admitting this as correct, and applying the figures to the relative efficiencies of electric lighting and incandescent gas lighting as they are known in this country, we fancy that Mr. Roberts must qualify his statement. There is another unexplained matter, and it is, notwithstanding these assertions, that the English gas companies operating in South Africa continue to show a remarkable vitality, and, year after year, their accounts evidence no retrogression, but, on the contrary, substantial progress.

Going further into the article, we find the writer saying that the problem before manufacturers in South Africa is to supply electricity as a necessary of life, and not, as in England, as a luxury for the rich; for it must be confessed that in South Africa electricity cannot yet be said to be the poor man's light. In Durban, with a population of about 65,000, there are some 2400 electricity consumers. This is strange, seeing that electricity so "easily out-distances" gas; and it suggests that Mr. Roberts should bestir himself on the commercial side of his business.

But leaving these small contentious points, it is of technical interest to learn from Mr. Roberts that his opinion is that attention will in the future be more profitably spent on the gas-engine for generating purposes. The Consulting Engineers to the Johannesburg Municipality have chosen gas-engines for their new electricity station; and their example, it is stated, will be followed, if the experiment is successful. Their decision is described as a bold one; but local opinion among engineers is growing in favour of the innovation. Mr. Roberts himself believes that such a gas-electric works will prove of great convenience and utility for municipal supply; and he regards the following as among the possibilities of such a combined supply: (1) Gas would be manufactured outside the town radius altogether. (2) No water is wanted, except in small quantities; and the site of the works can be chosen quite independently of the proximity of river or sea. (3) Both gas and electrical energy would be distributed. (4) Current would be distributed for lighting, for small motors, and for larger motors where the advantages of electric control are required, such as for lifts, printing-presses, &c. (5) Gas would be distributed for heating and for large engines. (6) All complication of high-tension distribution would be obviated, as gas would be delivered to gas-engine sub-stations where low-tension current would be generated directly. (7) Power at ¾d. a horse-power-hour, and current at 2d. a unit.

These are a few points in an article from the reading of which we have derived much pleasure; but we should like, either from Mr. Roberts or a gas engineer in South Africa (and in fact in any other of our Colonies), an article relating generally the experiences in the competition between the two illuminants under the conditions peculiar to their geographical situation.

THE INDUSTRIAL VALUE OF RAMIE.

[COMMUNICATED.]

A GOOD deal is being written about "Ramie" as a base for the manufacture of incandescent mantles; but possibly little is known as to its origin. It may, therefore, interest readers to hear a little more of it; and I hope it will set the inventive brain-cells thinking as to its developments, as it is evident we have but touched on the fringe of its possibilities. It is a nettle Urtica or Boehmeria known popularly as Ramie, Rhea, or China grass, and among Asiatics by a string of names, and used by them for many purposes for its peculiar properties. It is many times stronger than cotton, jute, flax, hemp, silk, and the like; it does not rot; and it has a brilliancy equal to silk, which it retains after washing. It is especially tough and strong; and it is this toughness which marks it out as especially advantageous for use in connection with incandescent gas lighting. Mantles when made of Ramie are stronger, and take the solutions more evenly, than cotton; and this gives it an advantage over that material.

A common error made by all manufacturers who seek to substitute Ramie for cotton, flax, and similar fibres is that they endeavour to imitate the conditions required by cotton, flax, &c. The spinner is instructed to spin exactly on the same lines, and to produce a result imitating that obtained by other fibres. Herein the writer considers a mistake is made. The very nature of the fibre being so distinct from other textiles points to the fact that it should be treated on lines more applicable to it. If cotton takes a certain twist, it by no means follows that Ramie must have the same to produce similar results. One of the causes of this fibre not being in more general use is the faculty to imitate all other textiles. But, instead of imitating, attention should be concentrated on the exclusive manufacture of those articles to which its properties are peculiarly and naturally adapted. This is borne out by its use for incandescent gas mantles.

This brings me to a thought which is enigmatical to my mind. How comes it about that our great gas companies, at first so opposed to incandescent gas lighting, now that they have acknowledged the advantages and adopted the principle of it, are not more enterprising and exploitive? They have all the facilities, the means and "sinews," for exhaustive experiment; and great advance would be made. Why do they not turn their attention to it, and, among others, experiment with Ramie. A properly constructed mantle would give special advantages to a gas company who are not hampered by the consideration of how to make a mantle to sell for the lowest price at the greatest profit. Their aim is perfection; and this would enable them to maintain their lights with the least expense. Ramie, therefore, is worth their attention.

Ramie has, however, a greater future than incandescent gas

mantles. Still this is an industry which will help to bring the fibre to the fore. It undoubtedly is the textile of the future. It makes everything the other textiles make, and also things in which they cannot compete. It grows where cotton can and cannot grow. Had more attention been paid to it, the present cotton crisis would not have arisen. It is inexplicable how an enlightened industrial country like England, with possessions capable of supplying every requirement and want, should have been so blind as to allow one country—America—to absorb practically the whole cotton-producing industry. At least 80 per cent. of the cotton is grown by America; and this accounts for the squeezes which are periodically inflicted. We have countries that could supply all our wants, yet we prefer to rely on the foreigner. Let us grow everything we want, and, while turning our attention to cotton, not overlook the claims of Ramie. Here are a few of them: It is many times stronger than cotton, flax, hemp, and the like; it has a very long staple, from 3 to 18 inches; it is easily grown, as it acclimatizes itself in almost any zone where agriculture is possible, though, of course, with varying results, as it crops in some latitudes as many as four times per annum; it is beautifully lustrous, being more after the nature of silk in appearance, it stands washing, and it resists the destructive properties of the laundry.

The writer could further expatiate on the merits of Ramie, but space forbids. He will conclude by stating that there is nothing which wool, cotton, flax, hemp, jute, and even silk, produces, which this fibre cannot imitate, and in most cases excel. Its durability and toughness alone commend it as an invaluable material, for its indestructible qualities. For incandescent gas lighting, as already pointed out, it excels all other fibres. Herein there is sufficient to prove its worth, and the writer would advise English planters and manufacturers to turn their attention to it. They must not make the mistake of expecting to find a fibre ready to hand that will at once compete with existing industries which have possibly taken a century to foster. They should start such articles as are peculiarly fitted for it, as in the case of mantles for incandescent gas lighting. The Germans and French are fully alive to the merits of Ramie, and are subsidizing their Colonies to encourage the growing of it. It is knocking at our own door. Admit it, and add vast wealth to the economy of our Empire's agriculture and industries.

PERSONAL.

Mr. HEDLEY HOY, of Leeds, has been appointed Assistant-Manager at the Lancaster Gas-Works.

Consequent upon the recent changes in the Engineer's staff of the Liverpool Gas Company, Mr. C. J. M'EWEN has been transferred from the Athol Street and Eccles Street works, and now has control of the Linacre station of the Company. As a testimony of the feeling of the employees towards him, they assembled, to the number of about 300, a few evenings since, for the purpose of making a presentation to him and Mrs. M'Ewen. It took the form of a gold hunter watch, together with a solid silver tea and coffee service, in Queen Anne and Georgian style, on a silver-mounted tray. Mr. T. Hodkinson, the foreman at the Athol Street works, made the presentation, and spoke in high terms of Mr. M'Ewen's relations with the employees, and referred to the respect and esteem in which Mrs. M'Ewen was held. He expressed regret at the termination of a long, harmonious, and friendly connection. Other speakers endorsed these remarks. In acknowledging the gifts, Mr. M'Ewen thanked the employees for the loyal way in which he had been supported, and said he hoped that happy relations would spring up between them and Mr. Astbury, the new Manager.

In their half-yearly report, the Directors of the Chester Gas Company announced the resignation by Mr. JAMES PYE of the position of Secretary, and recommended that a pension of £300 a year should be granted to him from the date of his retirement, in consideration of his long and valuable services. They also stated that they had appointed his son, Mr. FREDERICK A. PYE, who had had over twenty years' experience of the Company's employment, to fill the vacancy occasioned by his father's retirement. In moving the grant of the pension referred to at the meeting of the shareholders, the Chairman (Mr. John Gamon) remarked that Mr. Pye was 76 years of age, and had practically completed fifty years of service with the Company. The care and the zeal with which he had carried out his duties had only been equalled by his ability. The proposition was, of course, agreed to. On going to Chester in 1854, Mr. Pye entered the service of the old Roodee Gas Company, formed in 1851 by the consumers, in opposition to the Chester Gas Company. Two years later—in 1856—negotiations were entered into between the rival Companies, with the result that the Corporation assented to arrangements for an amalgamation, with a capital of £50,000, and authority to borrow £10,000. Mr. Pye was appointed the first Secretary to the existing Company, which in 1858 was incorporated by Special Act. The history of the Company since its formation has been one of steady progress; the consumption having risen from under 40 million cubic feet in 1858, to over 212 millions at the present time. It is stated that Chester was one of the first towns in the United Kingdom to adopt gas lighting; the charge at the commencement of operations having been 15s. per 1000 cubic feet.

SOME POSSIBILITIES IN THE FUTURE OF THE GAS INDUSTRY.

[COMMUNICATED.]

EVERY stage of scientific progress may admit at times of a certain amount of predication for the future, based on the experiences of the past. There is no such thing as finality—always progress. With regard to the gas industry, vast strides have been made in recent years; and each advance, intelligently reviewed, is pregnant with possible future developments. In comparatively modern times, the gas industry has passed through some very critical periods. What would have happened some years ago if Sir George Livesey had not fought, single handed, the growing tyranny of the Gas Workers' Union, unaided by any Company than his own? Then, somewhat later, when electricity blazed on the horizon, and gas shares rapidly depreciated in value, the introduction of the incandescent system of gas lighting saved the situation.

This is now a matter of history; the facts are indelibly written in the past, and nothing that can occur in the future can efface their importance. More recently, many changes have been made of a progressive character, and many debatable subjects have arisen. The one predominating question of the day is that of how to produce and supply the cheapest gas consistently with a fair commercial profit. Discussions are numerous; but whether it is water gas *versus* coal gas, whether it is statutory illuminating power, and the means to be adopted for its determination, whether it is the abrogation of sulphur restrictions, whether it is calorimetry *versus* photometry—in fact, whatever details are the topics of the hour, the central spot on the horizon of progress is conspicuously labelled "cheap gas." Pessimists there will always be who regard the cheapening of any commodity as a mark of reduction in quality. This, however, is not the case with the public gas supply, over which no radical change can be made without the sanction of Parliament, and the consumers' interests jealously guarded. The price of gas is unfortunately not solely within the domain of good management. This is a question which the general public do not understand; but good management can accomplish much, even under the most adverse circumstances.

We have now some leading and accepted facts in regard to the gas industry tending to the development of cheap gas. Chief of all these must be placed the almost universal tendency to the acceptance of a reduction of nominal illuminating power. A reduction of illuminating power from 16 to 14 candles means, from a carefully considered standpoint, considerably more than is indicated by the bare figures. The production of gas of over 14-candle power is accompanied with similar difficulties which attach to the manufacture of 16-candle gas, although to a less degree. It may be asserted without much fear of contradiction that any decent English coal even pushed by carbonization at high temperatures to its highest gas-producing capacity, will give 14-candle gas, when such gas is fairly tested. Anything much above 14 candles would necessitate the employment of either a higher class coal, or the use of some form of enrichment, both of which augment the cost of gas production.

If at any time in the future gas of a still lower illuminating power was considered suitable for the public gas supply—and such a possibility is by no means improbable—a larger field would be open for cheaper production, possibly by the employment of inferior coals, but more probably by the use of some diluent mixed with the normal coal gas. For this purpose, water gas would be presumably the most suitable, although many alternative methods might be adopted. It is, of course, superfluous to remark that the diluent should have a reasonable calorific value. Ordinary producer gas, with its excessive proportion of nitrogen, may be ignored. Apart from ordinary water gas, there is the methane-hydrogen water-gas plant, professing to produce 1000 cubic feet of 10 to 12 candle gas from 3 gallons of tar and 20 lbs. of coke, with a calorific value of 400 B.T.U. Ordinary water gas could, of course, be used as a diluent—carburetted to a minor degree so as to have a higher calorific value than the raw material. It is a question which needs settlement (considering that in the production of carburetted water gas the oil is the main expense), what quality of gas is the most economical with regard to the proportion of oil used. A large proportion of oil to produce (say) 25-candle gas and upwards means a risk of imperfectly gasifying the oil. What would be the converse? Would the production of (say) 10-candle gas mean loss of the full effect of the oil by partial carbonization.

Apart from the question of diluents in the production of gas of a low illuminating power, we have indications of the possibility of a largely increased yield from ordinary coal by a deviation from the usual methods. In the Settle-Padfield vertical retort system, we have claimed an increase of 3000 cubic feet per ton, with increased weight and quality of coke. It is true that the tar is sacrificed; but continuous carbonizing, automatically regulated, and evenness in the quality of the gas produced hour by hour, are counterbalancing claims worthy of great consideration. What an impetus it would give to the cheapening of gas to be able to increase the make by 3000 cubic feet per ton. The solid money value of this is infinitely greater than all the comparatively small savings in other domains. It will obviously have to be a matter of understanding that, when gas is supplied of 14 or

lower candle power, the method of testing shall be such as to record the actual illuminating value taken by a fair method.

The price at which gas can be supplied at a fair profit is obviously regulated by the cost of production; and the dream of gas at 1s. 6d. per 1000 cubic feet means such an immense reduction in the cost of manufacture that it is difficult to foresee how such a desirable result can be attained. The only possible direction is the acceptance of gas of comparatively low illuminating power, and possibly a radical change in gas manufacture. It is difficult to conceive much more economy in carbonization by ordinary methods than is already effected by the substitution in the more modern works of machinery for hand labour in the manipulation of raw materials and products.

With regard to products, the plants for the manufacture of sulphate of ammonia and for the elimination of ammonia from the gas leave little to be desired on the grounds of efficiency and economy. Sulphuretted hydrogen is on the more modern works utilized for the production of sulphuric acid; and cyanogen is also ranking as an additional bye-product. Purification may be simplified and the cost lessened by the abrogation of strict regulations over sulphur compounds; but as the total cost of purification is less than 1d. per 1000 cubic feet, much economy cannot be expected on this score. With regard to distribution, the supply of gas at high pressure would seem to offer some opportunity for economy, as well as the automatic lighting and extinguishing of the public lamps.

One practically untouched field in the gas-works of the present time is the matter of the waste of heat. On the main question of carbonizing, gaseous firing has no doubt effected great economy, but much remains to be done. It is no exaggeration to state that the waste heat from the most up-to-date of carbonizing plants would be sufficient, if intelligently directed, to create enough steam power to work all necessary machinery, run the sulphate plant, and perform numbers of minor operations without the use of any exterior fuel. The fuel thus saved would be available for sale, with a corresponding saving in general manufacturing costs. This question opens up a wide and comparatively unknown field. It would take a long and discursive treatise to sum up all the possibilities of gas in the future.

The ideal gas-works has still to come. Let us assume a brand new plant with all up-to-date appliances, and free from the encumbrance of old capital sunk in effete and obsolete appliances; assume also the supply of 10 to 12 candle gas, its distribution at high pressure, and the locality of the works favourable to the delivery of raw material and the disposal of bye-products—what price could gas be supplied at to afford a fair profit to the supplier? Surely lower than has ever been reached yet! There was possibly no time in which the outlook for gas was more hopeful than the present. "*Ex fumo dare lucem*" has been written in the past. The motto is destined to shine in ineffaceable incandescent letters in the future.

Manchester District Institution of Gas Engineers.—We learn from the Hon. Secretary of the Institution (Mr. H. Kendrick, of Stretford) that the next meeting has been arranged to take place at Bradford, on Saturday, the 10th prox., and will include a visit to the Exhibition, when an opportunity will be afforded to the members of inspecting the lighting systems in use there. The adjourned discussions on the papers held over from the February meeting have been further postponed until November.

The Lighting of Aldwych.—In the course of the Governor's speech at the meeting of the Gaslight and Coke Company last week (published in another column), it will be seen that he referred to the fact that compressed gas had been selected for the lighting of Aldwych. As the name of the light to be employed was not specifically given by the Governor, it may be pointed out that the system adopted is the "Millennium," of the British Compressed Gas Company, Limited.

The Junior Institution of Engineers will hold their summer meeting this year in Germany; Dusseldorf being the first stopping-place. Here, at the Town Hall next Saturday, the members are to be welcomed to the Fatherland by the Burgomaster and the Society of Architects and Engineers of Dusseldorf. The exhibition will be visited. Thursday morning will be spent at Hanover; and in the afternoon Berlin will be reached. The members leave Berlin on the Monday for Leipsic, remaining till Wednesday, when they go to Frankfurt-on-Main to visit on Thursday and Friday, by invitation of Mr. W. H. Lindley, M.Inst. C.E., the Municipal works, with an excursion to Homburg.

Masonic.—A determined effort is to be made at the next (October) election of the Royal Masonic Institution for Girls to obtain votes sufficient to secure the return of a daughter of the late Bro. Robert Hunter, of Chester. The case has been fully inquired into by the South London Masonic Election Association, who have undertaken to assist in the election of Violet Isabel Hunter; and promises of support may be sent to the Hon. Secretary, W. Bro. R. Elgar, 15, Love Walk, Denmark Hill, or to the Secretary of the Evening Star Lodge (No. 1719), Bro. W. D. Child, of the Gas-Works, Romford. This early intimation is given so that Brethren may reserve their votes for what is a most deserving case, as the fund raised at the time of Bro. Hunter's death is now getting very nearly exhausted.

THE NEW GAS-WORKS AT RIXDORF.

[Abstract Translation from the "Journal für Gasbeleuchtung."]

The second municipal gas-works at Rixdorf were brought into regular operation on Sept. 1 last; and with the completion of the coal-conveying plant on April 1, they present an example of a fully equipped works well deserving of the notice of gas engineers.

The new works for the time being have a productive capacity of only 35,000 cubic metres (= about 1,230,000 cubic feet) of gas per diem; but the plan of construction provides for quadrupling the present plant in order to meet the rapidly growing requirements of the advancing township of Rixdorf, which lies to the south-east of Berlin. The works are intended to displace the old gas-works, which had a productive capacity of only about 615,000 cubic feet per diem.

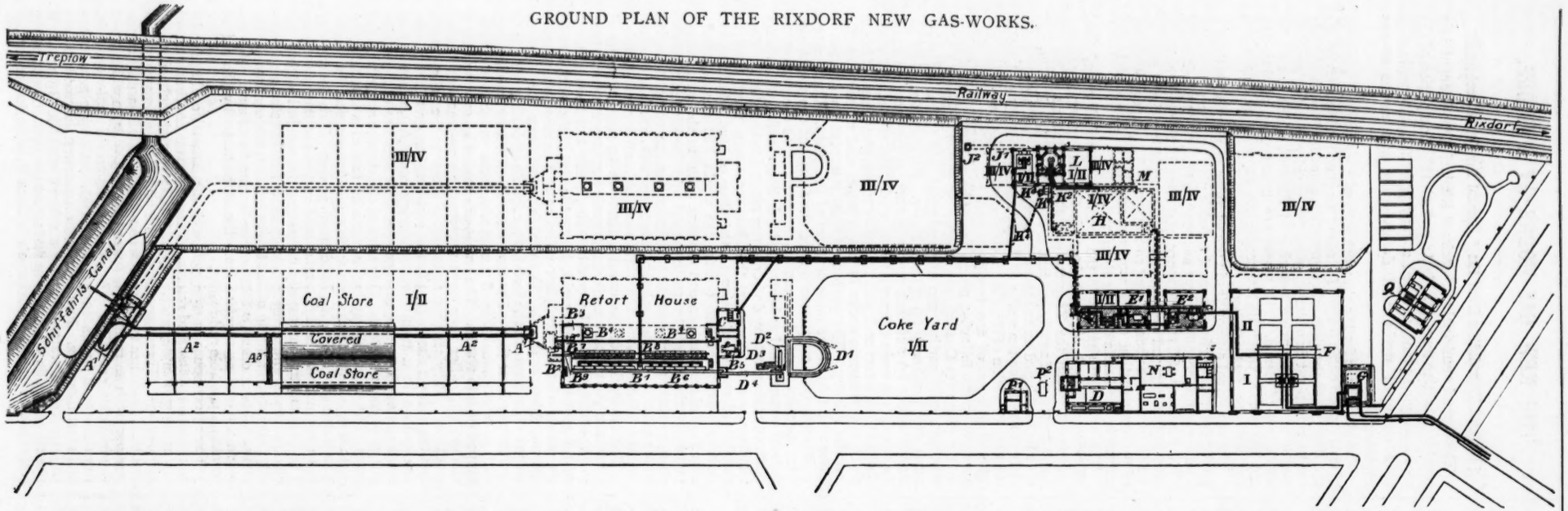
The municipal authorities in the summer of 1899 advertised a public competition for the most suitable plan for the new works. The second prize offered was awarded to Herr Karl Bernhard, a Civil Engineer of Charlottenburg, and Herr E. Körting, the Engineer to the Imperial Continental Gas Association, for a scheme which formed the basis of that carried out. The superintendence of the construction of the works according to this scheme was placed in the hands of Herr Bernhard.

The available site was in the form of a parallelogram, about 1640 feet in length, situated alongside the Berlin circular railway, midway between the Treptow and Rixdorf stations. One end has a frontage of nearly 328 feet to the Rixdorf Canal. The coal is to be unshipped on to the works at this (the north) end; while the gas will leave the works at the opposite (or south) end, which is in the direction of the old gas-works, where the gasholders are. The disposition of the buildings and plant then takes place naturally in the following order, as will be apparent on reference to the plan: (1) Coal-storage sheds; (2) retort-house; (3) bye-products, coke sorting and disposal plant, and tanks; (4) apparatus and purifiers; (5) station meter. Between the plant included under (3) and that under (4) there is interposed a cross road, with the main entrance to the works, the offices, and workshops at the street end, and the water tower, pumping and boiler plant, and ammonia works at the opposite end abutting on the circular railway. The working of these interposed parts co-ordinates with that of the main sections of the plant. Construction was begun on a strip, constituting one-fourth of the whole site, lying parallel to, and adjoining, the road. For the present, no railway connection has been provided, because the goods track of the circular railway does not run alongside the works. Care has been taken, however, that the conveying plant shall be capable of ready extension to the strip of land adjoining the railway. The plan adopted for the works had the advantage over that which was awarded the first prize in the competition, that it left the land between the canal and the circular railway open, so that any changes in the design for the complete works which might in the meantime become desirable, could be adopted without difficulty when the works were ultimately completed.

The navigation of the canal is liable to be interrupted for 4½ months in the winter; and consequently large stores of coal have to be provided for. The coal-handling plant has been made of such size that it not only will, during the rest of the year, handle the whole winter's stock, but will also at the same time supply the retort-houses direct. The coal is raised from the boats by means of a crane on the foreshore, capable of dealing with 35 to 40 tons per hour (A_1). The crane travels on a lofty iron framing, with a large funnel-shaped receptacle, from which the coal is tapped off into trucks. The trucks are hauled by cables along a viaduct (A_2), after they have traversed an automatic weighing machine. They are then either taken direct to the retort-house, and there down shoots (A_4) to the coal-breaker, or they are discharged on to a transverse conveying band (A_3), which moves longitudinally over the storage space, so that the coal may be put off at any part of it. One-third of the storage space is roofed over. The coal railway has two tracks, and runs at a height of 34 ft. 6 in. above the yard on an iron viaduct 492 feet in length. The transverse conveying band spans 59 feet. This coal railway is to serve both the first and second sections of the new works. The trucks have automatic couplings, the whole is driven by electric power, and all the necessary moves are effected mechanically, except the shifting of the trucks beneath the coal receptacle of the landing crane, which is done by manual labour. Men remove the coal as required from the store heaps by the aid of trucks on portable rail-tracks.

The retort-house is equipped with mechanical coal and coke conveyors and inclined retorts. There are two benches, each of six settings of nine retorts, 15 ft. 6 in. long, and inclined at an angle of 33°. These constitute one-fourth of the ultimate requirements. There are two retort-houses (B_1) situated parallel to one another, with an intervening space 19 ft. 6 in. wide, in which stand the four chimneys (B_4). They are cut off, on the coal-store side, from the yard by an engine-house (B_3), containing gas-engines and electro-motors. From this house are driven the coal-breakers (B_2), the coal-elevator (B_9), and a reserve coal-lift (B_7), which is placed alongside the coal-breakers. At the opposite end of the retort-houses are the workmen's lobbies C, with, on the ground

GROUND PLAN OF THE RIXDORF NEW GAS-WORKS.



A¹. Coal Landing Stage. A². Coal Railway. A³. Cross Conveyor for the Coal. A⁴. Coal Shoots. B¹. Retort-House. B². Coal-Breakers. B³. Gas-Engine Room. B⁴. Chimneys. B⁵. Machine-House. B⁶. De Brouwer Coke-Conveyor. B⁷. Coal-Lift. B⁸. Longitudinal Conveyor. B⁹. Coal Elevator. C. Workmen's Lobbies. D¹. Circular Railway to Coke Discharging Platform. D². Night Hopper. D³. Coke-Elevator. D⁴. De Brouwer Coke Incline. E¹ E². Condensers, Washers, &c. F. Purifier-House. G. Meter-House. H. Tanks. J¹. Boiler-House. J². Chimney. K¹. Reservoir Tower. K². Sludge Pit. K³. Waste Pipe. K⁴. Artesian Wells. L. Ammonia Distillery. M. Lime Pit. N. Offices. O. Store. P¹. Coke Loading Shed. P². Weighbridge. Q. Foreman's House.

floor, the engine-room, containing steam-engines for driving the coal-conveyor, the De Brouwer conveying trough, and the coke-sorting plant.

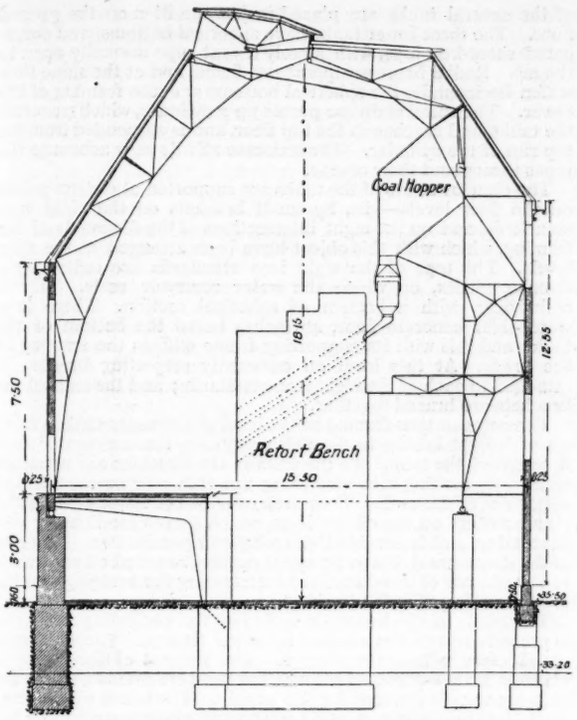
The arrangement of the retort-house will be evident from the transverse sectional elevation. The walls are ironwork, and the main truss not only props the iron walls and supports the roof, but also serves to carry the coal receptacles above the settings, the charging reservoirs, and the coal conveying stage. All lateral pressure is thus directly transferred to the foundations of the settings, so that the outer walls of the retort-house need to have only light foundations. This plan appears hitherto to have been followed only at the gas-works at M. Gladbach, where the retort-house has also been constructed by Herr Bernhard. This mode of construction has proved to be very simple and practical. On the crown of the retort-house there is an opening 16 ft. 6 in. wide, running the whole length of the house. This is covered by a Bernhard's patent tilting roof, which can be tilted so as to be shut on the windward side, and present an opening more than 4 feet high on the lee side. Heat, smoke, and steam are drawn out by the wind through this opening in a highly effective manner. The tilting of the roof is carried out by means of wire-rope pulls, to actuate which very little power is required in consequence of the simple manner in which the tilting roof is carried. The level of the floor of the workmen's lobbies is the same as the level of the stages in the retort-houses, and thus convenient communication between the stages and lobbies has been provided.

The De Brouwer coke conveying trough (B_6), on its exit from the retort-house, is prolonged into a coke-trough (D_4), rising at an angle of 25° to a height of 32 ft. 6 in. to the coke plant. There are here a night hopper (D_2), with a capacity of 5300 cubic feet, sorting screens, and various receptacles for the screened coke. The coke passes into the buyer's waggons without touching the ground. In order to cope with unfavourable states of the coke market, an ample coke yard has been provided beyond the retort-houses, for the storing of coke, which is deposited there by means of an elevated circular railway (D_1), similar to that at the Mariendorf works.

The foul main which conveys the gas from the hydraulic main in the middle of the retort-house has, in consequence of the interposition of the coke yard, a length of about 656 feet. It was possible, however, to carry it overhead, with a fall of 1 in 35; so that tar and ammoniacal liquor should run down to the plant-house. This overhead course, ultimately intended for four foul mains, follows the longitudinal axis of the works, and passes between the two large coke yards and over the works roadway. The mains are to be carried on a single row of lattice columns set in concrete foundations. The foul main, for the first section of the works, has a diameter of 20 inches, and is made of 0·2 inch metal, and unsupported between the piers. It is lagged with Remanite, and also protected from the effects of fluctuations of temperature by expansion-pieces and roller-bearings.

The plant-houses are to be situated on both sides of the principal axis of the works. Two buildings E_1 and E_2 have already been erected, and are intended to serve for half the complete works; but they are at present provided with plant for only one-fourth. The first room contains three water-tube condensers; the second, the exhauster, governor, &c.; and the third, a Pelouze and Audouin tar-separator, and a naphthalene and cyanogen washer. The next house contains two Reutter condensers with sprinkling appliances, and a rotatory washer for the extraction of ammonia. The effluent tar and ammoniacal liquor pass away with a natural fall to the collecting wells. There is a perforated floor in both houses above the cellars, to provide for the ventilation and lighting of the latter, in which there are so many mains and valves. This is similar to the arrangement followed at Mariendorf.

The purifying-house is a large triple-naved building. The middle nave is 72 feet wide, with lateral lights near the top of the walls; while the lateral naves are each 29 ft. 6 in. wide, and lower. The whole is thus 131 feet wide, and is a simple iron structure, requiring only $5\frac{3}{4}$ lbs. in the roof tie-beams per square foot of area covered. The sides of the building are also of ironwork filled up with hollow plates. There are four cast-iron purifiers, each 26 ft.



Cross Section of the Retort-House.

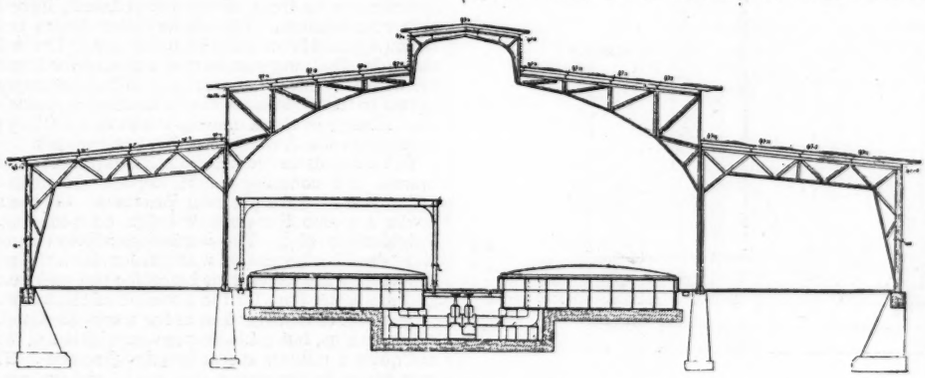
3 in. square, arranged as one set in the middle portion of the house. The riveted lids are raised by means of cranes traversing rails on the floor of the house. These cranes can be also shifted laterally, so that it is possible to handle the lid of a purifier of another set with the same crane.

The meter-house (G) is attached to the purifying-house, and stands in the south-west corner of the new works. It has been dealt with as a "show" room, having a wooden slightly vaulted roof on curved iron rafters, and walls with a wainscot of green tiled panelling with red wooden framing, and a simple painted frieze. The gas passes from the meter-house by two mains leading out of the new works to a governor-house alongside the gasholders, which stand on a detached portion of the old works. The governor-house is finished internally like the plant-house already described, and is equipped with valves and governors, suitable for working partly with a small gasholder, and partly with a new one of 880,000 cubic feet capacity.

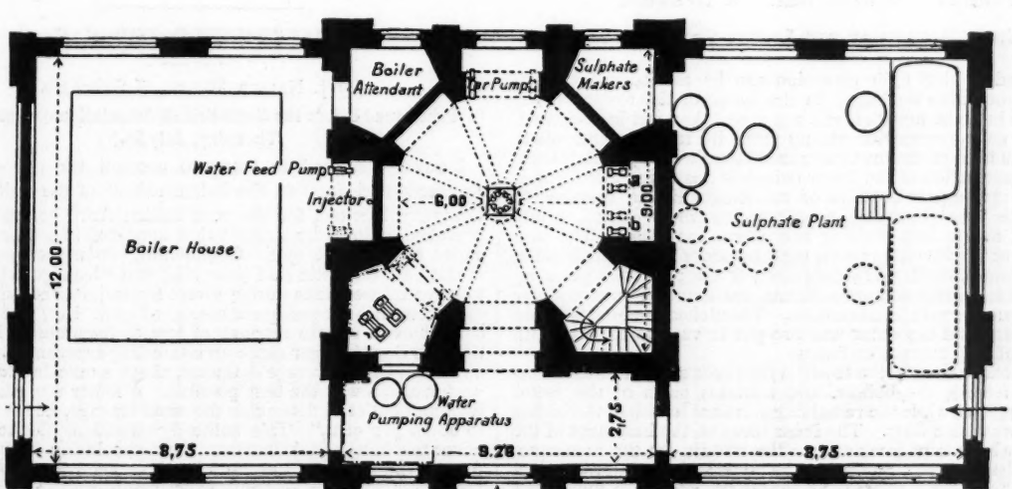
Alongside the apparatus are the tanks H, which are intended for Sections I. and II. of the complete works. They have a capacity of 40,600 cubic feet, and are of concrete, with the bottom with iron insertion, and a Monier roof with large man-holes and openings for light. The bottom of the tanks is about 5 feet below the lowest water-level.

The reservoir tower K has been erected alongside the tanks H. Its mode of construction renders it of special interest; and it will therefore be described somewhat fully. It has been made of a size suitable for the complete works, and has been purposely placed near the underground tanks or wells in which the tar and weak and strong liquor are collected naturally by gravitation. The tower is designed not only to give the requisite head for feeding these bye-products about the works for use and working up, but also as a water tower for the works' water which is obtained from artesian wells alongside it. In order to economize ground space, the several reservoirs have been constructed at different levels in the one tower, as will be seen from the sectional elevation. The water-tank, having a capacity of 33,000 gallons, is uppermost; and the lowest level of the water in it is about 98 feet above the ground. Next below is the reservoir for weak ammoniacal liquor; and then follow downwards (in order) the reservoir for strong ammoniacal liquor and the tar reservoir. These three reservoirs have each a capacity of about 9935 gallons. The lowest reservoir is at such a height that the tar may in the future be run off into tank waggons on an elevated railway; but for the present it is only delivered for conveyance by road. The lowest part of the tar reservoir is nearly 45 feet above the works yard. The lofty ground-floor of the tower was designed to accommodate the various pumps.

The boiler-house and ammonia-works are in a group of buildings directly connected with the tower, as will be seen from the plan. These are constructed for half the size of the complete

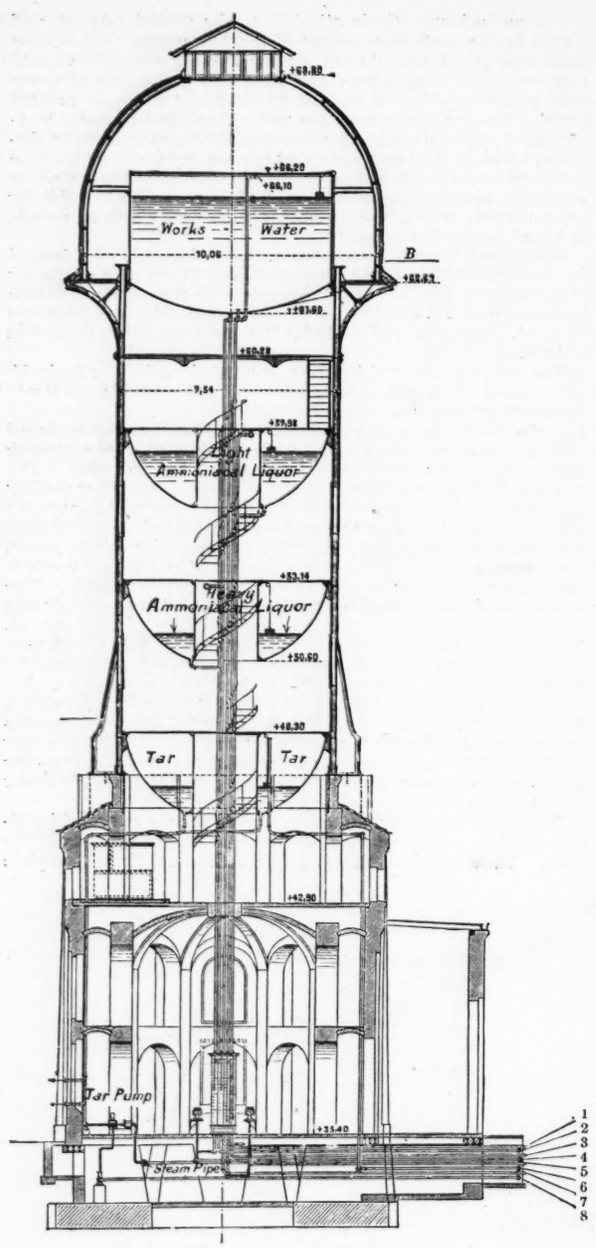


Section of the Purifier House.



a. Pumps for Strong Ammoniacal Liquor. b. Pumps for Weak Liquid. c. Rain Water Pump.

Plan of Boiler-House, Sulphate Plant, and Liquor Store Tower.



1. Ammoniacal Liquor. 2. Strong Liquor Overflow. 3. Weak Liquor Overflow. 4. Strong Liquor Suction. 5. Weak Liquor Suction. 6. Tar Overflow. 7. Works Water. 8. Tar Suction.

CROSS SECTION OF THE LIQUOR STORE TOWER.

works, and so that their extension can be carried out without interruption of the working. In the cellar of the tower, all the pipes are brought together, and are then taken out in a culvert, which is easily accessible at any point by removing the plank top. The base of the tower is quadrilateral. A special feature in the construction of the tower (which is about 125 feet high) is that the upper part consists of an octagonal iron framing, to which the four reservoirs constitute inscribed circles, firmly attached to the iron framing one above the other. The iron columns of the framing rest on eight masonry piers, with binding arches, domed vault, and strong circular ties; and the piers, by means of separate concrete columns, are founded on a circular slab of concrete with iron insertion. The niches enclosed between the columns and the outer wall are put to various uses on both the ground and mezzanine floors.

The room in front of the tower stands over a clean water reservoir for feeding the boilers, and contains parts of the water purifying plant, while the remaining parts are in one of the niches on the mezzanine floor. The inner room of the basement of the tower has been kept free as far as the middle for the accommodation of pumps, &c., needed in the course of the later development of the works. From the eight pillars, which are faced with tiles, spring eight binding arches to a central ring, through which all the pipes pass up vertically in the axis of the tower. A spiral staircase round these pipes passes up the tower to the floor just below the water reservoir; and indicators showing the contents of the several tanks are placed in juxtaposition on the ground floor. The three lower tanks have spherical bottoms, and corrugated sheet-iron tops, with merely a vent pipe normally open to the air. Radial bearers support the floors, and at the same time stiffen horizontally the spherical bottoms and the framing of the tower. The spiral staircase passes up a cylinder, which traverses the tanks, and reaches to the top floor, and is suspended from the top rim of the cylinder. The staircase affords easy access to the pipes throughout their course.

The circular struts of the tanks are supported at sixteen points on the floor levels—viz., by small brackets on the eight iron standards, and on the eight intersections of the diagonals of the framing, which with this object have been arranged at the floor levels. The tops of the eight iron standards are united by a circular girder, on which the water reservoir rests. This is cylindrical, with a bottom of spherical section. There is a water-tight concrete floor, 40 inches below the bottom of the tank; and this with its supporting frame stiffens the framing of the tower. At this level an outwardly projecting bracket is attached to each of the eight iron standards; and the ends of the brackets are braced together.

The octagon thus formed at the level of the water-tank is filled up with light lattice work, which supports the corrugated iron floor round the tank. To the ends of the brackets are attached eight iron arching ribs stretching upwards, and secured to the upper rim of the tank. They arch over to the lower curb of the circular drum on top of the dome, which serves for lighting and ventilating, and is provided with a lightning conductor. The ribs of the dome are stiffened by spiral purlins, rounded off externally to the contour of the dome, and intersecting the bridgings for the copper roofing with felt backing.

The whole of the ironwork, including the projecting brackets, is protected from the weather by stone facings. The diagonals stand clear within the facings. The interior of the tower is warmed by low-pressure steam from the boiler-house, where the high-pressure is reduced for this supply. The tower was erected by a Brunswick firm of engineers to the plans provided by the Consulting Engineer.

The boiler-house and ammonia-works constitute a block in immediate connection with the tower. At present, two flue boilers, each with 861 square feet of heating surface, have been introduced. Extension can be readily made without interrupting work. The boilers are fired with breeze; and, in view of the great length of steam-pipe between the boiler-house and the engine-room in front of the retort-house, have been equipped with superheaters. The works water comes from two artesian wells (K_4), and is softened for boiler use. The boilers also furnish steam for the pumps and apparatus and for heating purposes on the works. The steam pressure of ten atmospheres is reduced to two to three atmospheres for heating purposes, the bath-rooms, &c. Alongside the ammonia-works is a settling pit, the effluent water from which is run into the town sewers.

The administrative building (N) comprising offices, committee rooms, and counting house, adjoins the main entrance. The cellar of the building is used for stores. On the approach to the works are also the porter's lodge, coke-loading shed (P_1), and weighbridge (P_3). The workshops adjoin the offices. The officials' dwelling-house (Q), with garden, is on the north-west side of the works; the lower floor being for the assistants and foreman, and the upper floor for the manager of the works.

The cost of construction of the works as described, inclusive of all apparatus, but excluding the acquisition of the land, has been not quite 2 million marks (nearly £100,000). The construction was begun in the summer of 1901; and the greater part of the works was completed during the winter of 1902.

UNACCOUNTED-FOR GAS.

By J. NAPIER MYERS, of Saltcoats.

[A Paper read before the North British Association of Gas Managers, Thursday, July 28.]

I have attempted to bring to account the gas entered as "unaccounted for" in the balance-sheet of the Saltcoats Gas Company, Limited, for the year ending April 30, 1903. I was provoked to do so by a notice that appeared in a Glasgow newspaper on Aug. 14, 1902. Commenting upon the gas accounts of this city, the critic said (*inter alia*) that "leakage is largely due to temperature; thus during severe frosts, joints of pipes are apt to loosen, with a consequent escape of gas. But, under the best conditions, a certain amount of loss is inevitable. Recently a Scottish Gas Manager made an interesting experiment. He laid a new main of the average diameter, about a mile in length. The workmanship was the best possible. A meter was placed at the inlet and outlet to determine the exact leakage, and it was found to be 10 per cent." This authority considers that leakage can never fall below that amount. This conclusion is quite wrong, though the critique has an air of knowingness about it. It prompted me to make some experiments, and to endeavour to account for the "unaccounted-for" gas.

In Appendix A, there is a statement of the amounts of gas made and sold in Saltcoats for twenty years. You will note that the amount unaccounted for has been nearly 1¼ million cubic feet per

annum since 1885. With the increase in the annual quantity made, the percentage of loss has fallen from 15·7 to 5·3 in 1902-3. There has not been any patent process employed to effect this result, but just patient continuing in doing well. The story of our work is humdrum; but the result is not unsatisfactory. We enjoy some advantages in the distribution of gas in Saltcoats. We have a more equable load-factor than in a manufacturing town. The mid-winter demand can be supplied by 16 retorts, and the minimum demand can be met by 4 retorts only, for less than three months. The traffic in our streets is not heavy, beyond a builder's cart of bricks. Our subsoil is not crowded with many things "laid on." Our works occupy a central position, with mains radiating to all the cardinal points. The district is flat, supplied with mains not more than 6 inches in diameter, and we have not laid any mains less than 3 inches in diameter for twelve years. The bulk of our gas is distributed from main-pipes of 3 and 4 inches diameter. This permits us to make the connection of service-pipes to our mains by means of saddle joints. These are some of the advantages of distributing gas in small towns. There are drawbacks, however, that quite cancel these advantages, chief among these being the retail character of our business. There are 586 consumers of less than 5000 cubic feet per annum; and these we consider to be of next to no commercial advantage to us. Most of them will have no account in the winter, and their meters will deteriorate in idleness like all mundane subjects.

Our soil is not good for the life of metal pipe, whether lead or iron. The town is situate on the outcrop of the Ayrshire minerals, and the hollows between the ridges of the rocks in the lower part of the town have been levelled with the ashes from the old salt-pans. This is very porous material, and facilitates the "breathing" of the earth with the rise and fall of water in the subsoil. This moist breath condenses on the wrought-iron pipe, and quickly rusts it through. I have observed this to be the case if the service-pipe has been rested upon a hard water-worn round stone.

In attempting to account for the gas lost, I have looked for leakage in the store, on the road, or by unfair measurement. We will consider the store first. I filled a telescopic gasholder on the 1st of June, 1903. It contained 119,000 cubic feet of gas at 57° Fahr. at 8 a.m. The valve was not opened during the month of June, and on the 30th there were 103,000 cubic feet in the holder. It had lost 16,000 cubic feet. The temperature ranged from 49° Fahr. on the 17th up to 64° on the 4th; closing at 58°. The barometer was steady. The loss represents 13·45 per cent. in thirty days. We afterwards cleaned and painted the holder with two coats of white lead paint, put into it 124,000 cubic feet of gas at 56° Fahr., and filled the stand-pipes with water on the 24th of August, 1903. We allowed it to remain thus for four weeks, when it was found to have lost 11,000 cubic feet, or 9 per cent. in 28 days. In this case, the temperature did not rise above 60° Fahr., and then only on two occasions (Sept. 6 and 20). It fell to 41° Fahr. on the 14th. The barometer was fairly steady. This gasholder is telescopic, and when fully inflated holds 132,000 cubic feet of gas and gives 5 inches water pressure. There are no leaks in it apparent by any smell or stain on the paint. The only point of difference from other holders is that the storm water falling upon the roof and into the lute is discharged inside the holder itself, for the purpose of keeping the water in the lute and tank clean.

I used to think we were liable to the greatest loss in times of greatest rain. This impression, however, was not confirmed by these two tests. In June, we had 2 inches of rainfall in seven days; in September, we had 4¼ inches in fourteen days. The average of the two tests is 11 per cent. The average amount of gas we held in stock during the year was 132,000 cubic feet, 11 per cent. of which for twelve months gives me the sum of 174,240 feet as the first item to set down in my account against our total annual loss. (See Appendix B.)

The next place I look for loss is in the distributing plant. I will deal here with the main-pipes only. I had the opportunity of testing the soundness of a pipe laid down to supply a cottage hospital, about 1000 yards distant from our main. This was laid with a 3-inch pipe, and a 2-inch service into the hospital grounds. The 3-inch pipes were dry sand pipes cast vertically, with turned-and-bored joints. I favour these, for unless pipes are cast vertically, they cannot be made without the use of core nails or screws, which, being of wrought iron, cannot combine efficiently with cast iron, and sooner or later loosen and cause leakage at the points where they are introduced. The pipe was laid under the best conditions as to weather and soil.

For the purposes of this paper, I put 700 yards of this pipe under test and observation for four months. I fixed a wet meter at the inlet and a dry one at the outlet; these were surveyed weekly. In four months, the corrected register by the wet meter was 45,037 cubic feet; and by the dry meter, 44,651 cubic feet—showing 386 cubic feet lost.

We have eight miles of mains of various ages, up to 66 years, and of sizes ranging from 2 to 6 inches in diameter. Calculated on the same basis as the hospital pipe, the leakage would be 30,000 cubic feet per annum. But, considering the age of some of our pipes, I think I am entitled to double this figure, and consequently have set down 60,000 cubic feet as the second figure in our account. I will leave the service-pipes for the present, and reserve that head for my balance to square the account.

I will now look at the subject of registration, and deal first with the gas used in street lighting. We endeavour to ascertain the quantity of gas used for this purpose by the average meter system. The whole of the fittings on the street, with the exception of the meters, belong to the Town Council. We employ about one meter to every 20 lamps. If the pressure of gas and hours of burning were equable, one would expect the amounts registered by the meters to be nearly the same; but this is very seldom the case with us. Sometimes the all-night lamps are found to register less than those put out at midnight. But even if the meter lamp gets fair treatment in the matter of time, and he has done his best to keep the pace for the other 19 lamps, he is still behind, for he is handicapped by having to turn his mill.

I have tested several burners through different meters at various pressures, with the following results: The obstruction caused by a meter varied from 7·2 per cent. by a wet meter made in 1887 to 2·1 per cent. by dry meter made in 1890; the average for ten tests being 5 per cent. The amount charged to the Council was nearly 1½ million cubic feet; and 5 per cent. on this amounts to 73,560 cubic feet, which is the next sum carried to account against the gas lost.

The next subject I deal with is the meters in the consumers' houses. During the last ten years, we have pursued a campaign against all small and old meters, which has not been popular either with the capitalist or the consumers. For the year ending April 30, 1903, we had brought home to the works 93 meters lame or lazy, or otherwise suspect; and of this number 12 were found to be registering slow. The loss on these 12 corrected accounts amounts to 9941 cubic feet, which I have entered in our account as 10,000 cubic feet. I take no credit for condensation, as we get no liquid in the drip-boxes if our mains are sound. Neither do I put down any sum for difference of volume as between the registration at the works and at the consumers' meters. I judge that the temperature of the consumers' houses will generally be as high as that of the meter-house at the works.

The summation of the four counts I have set out still leaves a shortage of 958,100 cubic feet, which I have put down to defects in service-pipes. This balances the amount set out as gas lost (see Appendix B.). I have no doubt it will appear to other members of the Association unscientific to "dump down" the bulk of our lost gas to service-pipes. I have taken some trouble to find out what has become of the gas lost. I have noted all other ways of leakage that occur with us, and only the service-pipes remain to debit with the *x* quantity. This bears out Mr. Newbigging's conclusion that "leakage or unaccounted-for gas is due more to defects in service-pipes than to all other causes combined."

I will conclude with a quotation from a paper on this subject read by Mr. Hubert Pooley at Ayr in 1897, that "even in the case of a small escape of 0·2 cubic foot per hour, it will pay, at a selling price of 3s. 7d. per 1000 cubic feet, to expend £5 in repairs, if necessary."

APPENDIX A.

Year.	Quantity of Gas Made. Cubic Feet.	Accounted-For. Cubic Feet.	Unaccounted-For. Cubic Feet.	Percentage of Loss.
	Thousands.	Thousands.	Thousands.	
1883	5,605	4,941	663	11·8
1884	6,456	5,618	837	12·8
1885	7,681	6,474	1,206	15·7
1886	8,041	7,013	1,027	12·7
1887	7,845	6,870	975	12·4
1888	8,908	7,532	1,375	15·4
1889	9,018	8,028	990	10·9
1890	10,013	8,892	1,120	11·1
1891	11,175	10,080	1,095	9·7
1892	11,894	10,665	1,228	10·3
1893	12,642	11,419	1,222	9·6
1894	12,122	11,189	932	7·7
1895	12,756	11,632	1,124	8·8
1896	13,539	12,369	1,170	8·6
1897	15,331	13,935	1,395	9·1
1898	16,710	15,550	1,159	6·9
1899	18,557	17,099	1,458	7·8
1900	20,763	19,213	1,549	7·4
1901	21,031	19,477	1,553	7·3
1902	22,237	21,055	1,182	5·3
1903	23,822	22,547	1,275	5·3

APPENDIX B.

		Cubic Feet.
Amount of loss due to the gasholders, 132,000 cubic feet of daily stock, at 11 per cent. per month = 14,520 × 12		174,240
Do. due to distribution mains, on the basis of double the loss on the Cottage Hospital main	(say)	60,000
Do. by street-lamps, 5 per cent. on 1,471,100 cubic feet.	(say)	73,560
Defective meters	(say)	10,000
Difference of volume between registration at the works and consumers' meters.		nil
Loss due to defects in service-pipes and junctions with the mains		958,100
Total gas lost (1903)		1,275,900

Discussion.

The PRESIDENT (Mr. J. Robertson, of Dunoon) said Mr. Myers had given them a very painstaking paper, as he might call it. He hoped it would bring forth a good criticism.

Mr. T. WILSON (Coatbridge) said the members were all much

indebted to Mr. Myers for the valuable paper he had given them. He did not think there was in the room a man who had taken the same trouble and pains as Mr. Myers had taken to discover leakage. He was always of opinion that coal gas made at a high temperature was permanent; but he had discovered that it was not. He thought he had found a mare's nest some 18 or 20 years ago. He made a holder, filled it with oil gas, which was going to be a very cheap enricher, and before twelve days the oil gas had gone the way of all the world. He had everything tested, and there was no trace, even of smell. There was no doubt that it had gone back in the shape of oil. The presumption was that Mr. Myers' holder was cracked. Some 11 per cent. was a big quantity to lose in one month. If he had kept the gas for twelve months, it would have disappeared altogether—if he had kept the holder as he had it, the gas would have disappeared. So that they must multiply the 11 by 12, to give them the real loss—gas companies, he believed, balanced their books annually. There was not, therefore, so much to be astonished at. His opinion was that leakage was largely due to faulty meters; and he thought they were on the right road when they removed all suspicious meters. He made a raid, some years ago, on meters at Coatbridge. He found that they were registering at the rate of 40 per cent. slow before they ceased to supply gas. He took out about 4000 of them; and this reduced the leakage from 18 or 20 per cent. to something like 8 or 10 per cent. He thought there was a great deal in the meters. They were not perfect—neither the wets nor the drys.

Mr. J. Carmichael (Barrhead) said this was a question that all gas managers were interested in; and any hint he might receive which would enable him to keep the gas flowing in the right direction, so as to receive its value in money, was ever welcome. Some years ago the leakage was pretty high in most towns; but of late years there had been a determination on the part of gas managers to reduce the unaccounted-for gas—and with some success. Some were said to have got so low as even 3 per cent. But what Mr. Myers had pointed out was that this did not always mean that leakages had been stopped, but that there had been a arge increase in the co nsumption of gas. He did not think that Mr. Myers did himself credit when he put it down in this way in regard to Saltcoats, because he was convinced that, since 1885, Saltcoats must have doubled its mileage of mains. Mr. Myers did not seem to put down leakage to temperature. He (Mr. Carmichael) differed from him on this point. There was no doubt that, if they registered their gas at a high temperature—summer and winter—there must be a difference; and it must add to the unaccounted-for gas in the winter time, when they considered the exposed position of many of their consumers' meters. Mr. Myers spoke of his holder. From this holder there must have been a very large leakage. He (Mr. Carmichael) could speak of that, because Mr. Myers and he put up a holder at the same time, and he had the same experience. A large quantity of gas was lost in the course of a few weeks, when shut down; and how it went he could not tell. He would like to ask Mr. Myers if he thought that the expansion and contraction that took place, day and night—when they considered the number of rivet-heads, bolt-heads, and sheets—might have a little to do with the leakage. He would have been better pleased if Mr. Myers had carried his investigations a little further, and experimented on his old holders, and seen what he lost in them. Then, he thought, he put too little upon his mains, when he had about 8 miles of mains, and only some 140 or 150 cubic feet a day of loss. He was going to ask, regarding the 700 yards of mains, if the meters were tested to see whether they registered equally. Perhaps a little difference in the registration might have caused the loss. Then, in regard to the services, he thought that Mr. Myers put it at too high a quantity. It seemed to him that if he were satisfied in his own mind that this amount of loss was taking place in the services, it would pay him to renew every one of them. In two years, the outlay would be repaid. Mr. Myers allowed nothing for blowing off in the purifiers, nor for any loss in making connections to the main pipes. It was a very interesting paper indeed, and would help to waken them up a bit on this important question, and induce gas managers to look into every detail, so as to reduce leakage. There was only one other point he would like information upon; and that was, Ought not the percentage of leakage to be stated per mile of main? If a man was making 20 million cubic feet of gas a year, and distributing it over 5 miles of pipes, and had 5 per cent. of leakage, was he not better than a man who was making 20 million cubic feet a year, and was distributing it over 10 miles of mains, and had 10 per cent. of leakage? It was only 1 per cent. for each mile of main.

Mr. W. Fairweather (Kilmarnock) thought there was one thing they could scarcely accuse Mr. Myers of—that was in being careless about his leakage. He found that he had only about 5 per cent. of leakage altogether; and he thought this was very satisfactory. In talking about the gasholder, he understood that both Mr. Myers and Mr. Carmichael had new holders, and he thought that any leakage which had taken place in the holders had been due more to defects in the riveting, or something of that kind, than to anything else. Every place was differently situated for leakage. For instance, Mr. Myers had not any great heavy traffic going over his streets; consequently his leakage would not be so great as it would be in manufacturing towns, where there was heavy traffic in the streets. He would be very pleased if he could get his leakage down to nearly half of what Mr. Myers had. It usually amounted, with him, to 8 or 9 per cent. He was very pleased when he got it down to this, and he did not expect to get it below the fignre named. Possibly, somebody who should come after him might blot it out altogether; but he was very thankful to get it down to what it was.

Mr. W. B. M'Lusky (Perth) said he knew that for a good many years Mr. Myers had presented a very creditable return of gas sold per ton of coal carbonized—sufficient to indicate the attention he paid to this work. Notwithstanding all the investigations Mr. Myers had made, he thought that the grand result of the gas sold per ton was really the crucial point, because they knew that the amount of unaccounted-for gas largely depended upon the adjustment of the station meter, and they had had to complain time and again about the method adopted by meter-makers in testing station meters. Invariably a station meter was tested with the outlet open—without any load on it; and when they began to use the meter, the water-line was immediately altered by the back-pressure from the holder. In some works, this would amount to 2½ inches; in others, 8 inches. Another question was the temperature of the gas going into and leaving the station meter. The percentage of moisture in the gas after it left the purifiers must also be reckoned with. He remembered Mr. Herring relating his experience to him in this matter; and he thought it was most valuable experience. In Huddersfield, Mr. Herring found that moisture was not only affecting his leakage, but was also affecting the illuminating power of the gas enormously, as it naturally would do; and he overcame this by grinding lime shell and putting a little of it on the top of the lime in the purifiers. The moisture in the gas was absorbed by the lime shell, Another point was shrinkage. Mr. Myers disregarded any kind of shrinkage. Some years ago, he (Mr. M'Lusky) investigated the point. Being situated in one of the coldest towns in Scotland, he had an opportunity of testing his gas under rather severe weather conditions. He put thermometers in the mains, to ascertain the fall; and he found that the shrinkage of bulk alone accounted for 5 per cent. This was easily reconciled with theory, taking the expansion of aeroform bodies at $\frac{1}{491{\cdot}4}$ of their bulk at 32° Fahr., or 1 per cent. for every 5° Fahr., they found that a difference of 20° between the temperature of the gas at the station meter, and that at the consumers' meters would account for 4 per cent. of the "unaccounted-for gas." And how many meters did they find frozen, and unable to work at all—showing that the temperature had fallen below 32°?

Mr. J. Ballantyne (Hamilton) did not wish to say much in regard to the paper, but he could not help asking Mr. Myers with regard to those "lazy" meters he had, if he had no active ones—meters working the other way—at Saltcoats, because, if he had no meters registering fast, he should say he was a very happy man, or his consumers were. In the case of dry meters, he was afraid they found many of them registering up to 10, or even more, per cent. fast. Mr. Myers took no account of this; and he was afraid that if he had taken the other 93 meters which were not suspect, he might have found among them as many registering over as he found among the suspects. But, with Mr. Carmichael, he entirely agreed that the great bulk of their loss was through the meters. It was not so much as Mr. Myers had said. With all his ingenuity, he had only accounted for 25 per cent., leaving the other 75 per cent. to be accounted for in service pipes. Now, service pipes were faulty; but he thought the greatest leakage was in the meters. They registered their gas at 60° Fahr., which was a very considerable temperature, as he was quite certain they did not in Scotland have this temperature in their works for more than two or three months in the year, at the most; and he had always thought that this was one of the reasons why the loss by leakage in Scotland had always been higher than in England. There was a higher temperature in houses in England than they had in Scotland. Those who had been accustomed to study the thermometer would bear him out that 60° Fahr. was a considerable heat. They did not have this heat in most of their houses. Of course, if a meter were placed in the highest corner of the kitchen, they would probably have such a temperature, and a little more; but in many towns the meter was generally placed in some out-of-the-way place, where the temperature was very much lower than in the kitchen—and the kitchen was always the warmest part of the house. He was convinced that there was generally an average of 10° between the gas registered at the works and that registered in the consumers' houses. This was really where they lost a great part of their gas in Scotland; and they would always have this to contend with, because of the lower temperature they had all the year round.

Mr. W. Ewing (Greenock) said this question of leakage in gas-works was a very important factor towards economical working. In some places it was impossible to have a low leakage—such as in towns where they had coal mines, breaking pipes, and the like. A high leakage was always maintained in these towns; but his opinion was—like that of Mr. Ballantyne and other speakers—that the meters accounted for a great deal. From the station meter to the consumers' meters there was a considerable variation of temperature. He had noted it, and found it sometimes as much as 25° to 45° Fahr. All old meters should be periodically inspected—say, once every five years, or oftener. It paid to keep an expert man for such a purpose in any works making 80 millions a year and upwards. Very often he had found a meter

in use for thirty years, had tested it carefully, made corrections for temperature and pressure, and found it absolutely correct—especially an old wet meter. He had tested dry meters, after being 25 years in use, and found them absolutely correct. He had tested them after three years in use, and found them considerably wrong. He always endeavoured to get a meter which would sharpen up to its work. It might start all right, and in a year or two it would be slow. Those were the meters which were usually well made. A meter of this description was generally well made. They should all aim at getting a reliable meter, of the best possible workmanship. There was more in this than met the eye. He might say, in connection with the registration of meters, that an old friend of his told him recently that he had actually sold more gas than he had made; so that it would seem that there was bound to be something erratic in meter registration, sometimes, after all.

Mr. MYERS (closing the discussion) said he could only thank the members for the gracious way in which they had received his paper, and the kindly way in which they had dealt with it. He quite knew that it was rather a parochial order—his personal experience at Saltcoats. But he thought it was better to tell them of a subject he knew something about, than to theorize about matters, perhaps, of more metropolitan interest. The figures given involved a good deal of labour. He did not wish to take more credit for them than he ought. They were, in some instances, collected, or collated, at the outset merely for the benefit of the Gas Company for whom he worked, as they looked upon a million cubic feet of gas lost as an enormous business, and they were apt to regard it somewhat as the politician looked upon the unearned increment—as something to be laid hold of, by all means. And so, in endeavouring to account to them for the unaccounted-for gas, he thought it would be a not uninteresting story for the Association; and he was glad that they had thought it so. He did not think he need reply *seriatim* to the various remarks and criticisms. These fell under two or three heads, chiefly those of temperature and shrinkages of volume—particularly the latter. He thought this was the point which had been dealt with to the greatest extent. He did not ignore the matter, but gave it careful consideration, and came to the conclusion that their meter-house, which was in rather a cold situation, and never struck him as being at all a very warm place—it was the place where he spent his time every morning, testing the quality of the gas, and it rather struck him as somewhat of a cold place—it occurred to him that most of the domestic houses, where the gas was consumed, would be of as high a temperature as the meter-house. They knew that Saltcoats was what was known in the West Country as a coast town—a visiting town; and thus it was a town of small houses. Some of them, he thought, were too small; perhaps those who dwelt in them thought so also. That being so, when gas was being used, the meters worked in a fairly warm temperature; and he considered that the temperature of the meters, when the gas was being sold, would, in most cases, be as high as the temperature of their meter-house. He therefore took no credit for the skrinkage of volume. That was his reason for taking up the position he did. Mr. Carmichael had a large number of questions and queries to put, one of which dealt with the expansion and contraction of the holder. Probably the riveting of the plates of the holder might not be so rigid as they should be, and the expansion and contraction might just cause an amount of work which would be the cause of the loss—a loss which could hardly be called leakage, which had been described as "enormous"—a general oozing out of gas over the whole structure, without being of such volume at any point as to sustain a light. He really thought that this was what ailed his holder. He had no doubt in his mind that the quantities he had set out in the appendices to the paper were the exact amount of the gas that was lost; and that was, he thought, the direction in which it was lost. Mr. Ballantyne had said that while he had noted the "lazy" meters, he had said nothing about the "lively" ones. The method of testing meters was one to which he gave a good deal of attention—perhaps as much as Mr. Ewing would desire; and, without speaking positively by the book, he could say, generally, that the number of lively meters he came across were very few indeed. He embraced every opportunity which presented itself for changing a meter. If a consumer complained of his meter causing an unsteady light, or that he was not getting sufficient light, or that he would like a dry meter, or that he would like a slot meter, or that he would like a bigger meter—he was generally very ready to change the meter, especially if he was anxious for a change, and would pay the cost of the exchange. In the testing of meters, it had been his experience that not more than 2 per cent. of the meters changed were ever found to be going fast. To him, it seemed as unlikely that a meter should go faster than the gas would drive it, as that a water-wheel would go faster than the water would turn it. He had just, in conclusion, to thank them for their patience in listening to him.

The PRESIDENT did not intend to say very much regarding Mr. Myers' paper, but simply to ask the members to accord him a hearty vote of thanks. At the same time, he thought he had been rather severe on service-pipes, and not severe enough on the mains, because, if he had 8 miles of mains, he must have a good many joints; and if he had only a leakage of a cubic foot per hour, he would have a total of half-a-million cubic feet in the year. If he (the President) could get his leakage down to this proportion, he would be very pleased indeed. His district had an evil reputation for leakage. He had 22 miles of mains, with about 100 consumers to each mile. One-half of the consumers came to the town with the swallows every spring, and they went away with the swallows in the autumn. The result was that many of the houses were closed up; and their leakage was just as high as it had ever been. He was afraid to tell them the percentage. He thought that Mr. Myers had given them a most painstaking paper—a paper which touched every one of them. There was nothing which a gas manager hated to be asked about, or to think about himself, as his proportion of leakage. It was a thing they never could get low enough. He had heard of a manager who had got it as low as 3 per cent.; and he must have been a very happy man, indeed. He should not mind if he could get his down to this quantity.

NEW GAS-WORKS FOR BORDEAUX.

In the "JOURNAL" for the 26th ult., a notification appeared of the intention of the Bordeaux Gas Company to construct new works, and of their desire to receive, from constructing engineers and others, plans and suggestions for carrying out the undertaking. For the best of the schemes submitted, three premiums of 300 frs. (£12) and two of 500 frs (£20) will be awarded. We have received from M. Jules Avril, the Company's Manager, the plan of the site and the specification of the proposed works, from which we take the following particulars.

The new works are to be erected in the Bacalan quarter, which is situated to the north of the city, on a site having a total superficial area of 220,000 square metres (264,000 square yards), which since 1885 has been occupied by a gasholder of a capacity of about 700,000 cubic feet. The available portion of the site is 850 feet wide and rather more than twice this length. It lies between two public roads, and extends down to the edge of the Garonne. For about 5 feet from the surface, the soil is of the ordinary kind; but beneath this is a bed of slimy clay to a depth of 33 feet, resting upon river sand, having below it a layer consisting of a mixture of this sand and gravel—the two being together about 20 feet thick. Experiments made from time to time have shown that the ground must not be loaded to the extent of more than 3½ tons per square metre. Nor must underground construction be attempted; the natural water level, which, moreover, is affected by the tides, being almost up to the surface.

The works are to have a productive capacity of about 530 million cubic feet per annum; the average daily capacity being about 1½ million cubic feet, and the maximum (reached generally on the 24th of December) about 2¾ millions. Allowing 15 per cent. for reserve, to meet cases of accident or stoppages, the maximum daily production is brought up to rather more than 3 million cubic feet per day, corresponding to the carbonization of 300 tons of coal. This is the basis on which the new works should be laid out. At the same time the growth of the business must be taken into account, and allowance made for extensions; while at the outset it will be requisite to have certain of the buildings and portions of the plant of adequate capacity to meet this growth. For example, taking 530 millions as the annual productive power, the new works could be enlarged successively by fractions of 176⅔ million cubic feet, until they attained double their original capacity, or 1060 millions.

With regard to plant, as already mentioned, there is a gasholder on the site. It is in three lifts, stands in a metal tank above ground, and has an outlet-pipe 3 ft. 6 in. diameter connecting it with the town mains. This holder will have to be taken into account in arranging for the storage capacity of the new works. There is also a governor on the outlet-pipe of the holder; and though it may be displaced, its utilization should be reckoned for. The coal used will be English, and, in view of the proximity of the works to the river, its conveyance by that means must be provided for, and a landing-stage included in the scheme, though not necessarily shown in detail in the plans submitted. These must include arrangements for the discharge of the coal and its conveyance from the quay to the stores.

So far as residuals are concerned, coke may be conveyed from the works by river or road, or by rail connected with the dock lines. Tar must be disposed of to a dealer; the only provision to be made in the new works being wells for its reception. Nor will it be necessary, for the present, to provide for the treatment of the ammoniacal liquor, as this will be made the subject of a special contract.

According to the concession granted to the Company on the 16th of March, they were to construct, within a period of two years, works equipped with the most approved plant for the manufacture and purification of gas; and the plans are to be passed by the Municipality. Subject to the conditions laid down in the specification, an indication of which has been given, the greatest liberty is allowed the competitors in the preparation of their scheme, whether in regard to the system of constructing the settings of retorts, the arrangement of the purifying plant, the transport of the coal and other materials, or in any other respect. There is not much time at the disposal of intending competitors, as the plans must be delivered at the Company's offices in Bordeaux on or before the 30th inst.

MR. SHELTON ON THE LABOUR QUESTION.

In the "JOURNAL" last week, we noticed the address of Mr. Rollin Norris in opening the Gas Congress at the St. Louis Exhibition. It was followed by a paper on "The Labour Question," by Mr. F. H. SHELTON, of Philadelphia, of which we give the principal portions.

Of the many subjects that are appropriate for consideration and discussion by a congress of Gas Associations, there are few of more importance than that I have chosen. The growing prominence of the labour question, the difficulty of solving the many problems that it involves, the desirability of improving present conditions, and the many points of view possible, make it peculiarly suitable as a subject for our consideration. In all company operations, there are various relations that the employee may occupy. He may be merely a hired man, without consideration of any sort, or he may, while working on the pay roll, yet be a partner in the enterprise. These are the opposite extremes. Between them are various positions that the employee may occupy; that is to say, there are various features that may be put into effect—naturally, by the employing company—that will improve his position in various degrees beyond that of the mere hired man.

The plans for improving the workman's condition appear to me to group into four classes: (1) Where he is the recipient of physical comforts and pleasures given by the company, and beyond those elsewhere customary. (2) Where some mutual benefit association is also in effect, largely promoted and supported by the company. (3) Where, in addition, there is a division of the profits of the business from time to time by the company voluntarily. (4) Where, highest of all, some plan is in effect wherein the employee shares in the profit of the business, not as a one-sided bonus or charity, but as a full partner through the medium of some co-operative scheme. It may help to clear our understanding of these four different levels by describing practical instances of each.

(1) *Physical Comforts and Pleasures.*—The following items are in vogue in numerous United States gas companies: The providing of commodious wash-rooms or lavatories, where the men can comfortably change their clothes and wash, &c. Such rooms usually have tubs, shower baths (with individual keys), and other conveniences, in marked contrast to some conditions of indifference as to how the men are fixed, with no facilities, or anything being considered good enough. The providing of a mess-room or dining-room, with a gas-range, tables, chairs, &c., where the men may take their meals, warm coffee, &c., more comfortably than ordinarily. The fullest development of this feature includes the serving by the company of certain meals or foods at cost price, or less, to the employees. The company's reducing the cost of living to the employees, by giving gas, coal, coke, &c., free, or at cost or less than the regular price. Making gifts in various forms; giving an extra day's pay per month for good record, or occasional half holidays without loss of pay, and not deducting for absence for illness or other good cause. Employees' insurance and doctors' bills are one form of this. Giving opportunity to make extra money by commission allowed on new customers' business, range sales, &c. Providing pleasures, such as picnics in the summer, dances or theatre parties in the winter, &c. All the foregoing, while features of improving the employees' comfort or pleasure, are far short of the things that advance his position or earning power.

(2) *Mutual Benefit Associations.*—By these I mean associations usually formed by the employees to advance their interests in various ways, but with active assent and support and more or less participation on the part of the company. Such associations can, and usually do, take in all classes of a gas company's employees—works men, fitters, office men, &c.; and very desirably, as one element tends to offset another, so that no one end runs the association. A broader joint view results, and all members better understand the company's work and position. Such associations usually meet monthly for discussion of business and methods, have annual picnics and dances, sick and death benefits, &c. If really run for such purposes, they are enormously desirable, as they serve to make a better understanding and to minimize misunderstandings between the men and the company, and greatly tend to reduce the likelihood of union and strike troubles. If they are simply chapters of labour unions in disguise, they are dangerous. If sincerely managed, the company can aid them profitably; but it must not attempt to "run" the association, as this is fatal. Unless the company allow the men to manage it, its purpose will be neutralized. The practical way is for the company to have a few memberships in the association, so that it may be in touch with what transpires or is proposed, and can extend its greater experience in suggestion and advice. In my opinion, this plan is perhaps the most practical of the several possible things for improving the workman's condition, especially where the schemes I have still to refer to are too ambitious, or for some reason not feasible. This second step, however, does not give the workman any money in addition to his regular wages.

(3) *Dividing Profits.*—It may be said that extra pay, gifts, and the features above described are profits indirectly divided. While this, in a sense, is so, these gifts are intermittent, and carry but little reciprocal obligation on the part of the workman. He accepts them, and generally appreciates such points extended by the company, but has no especial sense of his having to do much, if anything, in return. The underlying idea of a profit-sharing plan is based on the principle that, if a workman's record is particularly good, and conforms to a certain standard established by the company (and understood by the employee), then the latter becomes entitled, at regular intervals, to a cash bonus or premium over and above the regular pay for his work. Several companies in America have extended this to their men, and it has nearly always taken the shape of a semi-annual dividend (usually at the rate paid to the company's stockholders) upon the amount of the men's wages. The effect of this is to give the workman stock dividends without his having to lay out or buy stock. It is a bonus for good record; it is a dividing of the company's profits, but it is only a gratuity after all. The company can stop it at will, and the employee has no rights, nor the partnership position, feeling, and stimulus that a true co-operative plan involves.

(4) *Full Partnership.*—This is a scheme whereby, in addition to most of the preceding features, the company have further a plan whereby more or less of the bonus that a man gets must be invested in their stock, so that the man cannot dissipate his premium, but must save it; becoming a stockholder, and thereby having his proportion of his earnings and a right to vote and a voice in its management—*i.e.*, partnership in the business. The best instance of such a plan is that of the well-known South Metropolitan Gas Company of London, wherein, after severe labour troubles, it was started some fourteen years ago, with the result to-day that, among some 4000 men, 80 per cent. are stockholders in the Company, having steadily purchased about $950,000 of the shares. Strikes are unknown, and a harmonious labour condition exists which I venture to say is the envy of most of the other English gas companies. The same plan, in substantial points, is in vogue in the Crystal Palace District Gas Company and the Commercial Gas Company, in London, as well as in the Chester United Gas Company, England. In each case the Managers have written me that the results are most satisfactory.

In connection with this subject, it is of interest to note what has been done, or not done, on such lines by United States gas companies. Some months ago, I addressed a circular-letter of inquiry to all the gas companies in America and in Canada. I received a large number of replies from all sections, and from companies large and small; and I am in a position to say, speaking generally, that as yet there is but a small amount of profit-sharing on the lines of step No. 3 described, and but one instance of step No. 4 in this country, to my knowledge. There are instances of mutual benefit associations, several very successful; and there is a great variety of cases where gas companies expend money in the way of conveniences and pleasures to the men. The interest in the subject, however, was most marked. Many replies referred to its importance, and the desirability of more being done than is done; and such replies and thoughts were largely the warrant for my presenting to you the subject for discussion. In a very few cases adverse replies were received, including one notably large company, to the effect that favours, advantages, and profits shared were not appreciated; that they gave a bad man as much as they did a good man (which a proper plan does not); that gifts soon came to be looked upon as a matter of right; that more money meant more drunkenness; and that where these profit-sharing ideas and advantages had been carried out there was just as much trouble, and no apparent resulting benefit, when strikes came.

I cannot subscribe to such ideas, or feel that they are generally right. I am confident that the great majority of gas men agree that, in the main, such things do help, and that, other things being equal, the company are better off who have a record of sincere endeavour to improve their men's condition. While, undoubtedly there is a percentage of men who jeer at a company's advances, believing that they conceal some overt aim, I believe the majority in the ranks of gas companies' employees are intelligent enough, fair enough, and practical enough to appreciate rational features which a company may inaugurate for their benefit. The great trouble in our labour situation is the apparent indifference of men to the company, and *vice versâ*—the feeling that the relationship is measured only by the price per hour paid. But if human instincts and proclivities are given half a chance, the better feelings quickly respond, and an immeasurably better relationship and understanding follow. And if a company will evidence some interest in their men, will go out of their way to improve their comfort, increase the things that make life interesting to them, and enlarge their pay, surely in the great majority of cases the right response will be found, and both men and employers be the better for it.

The greatest factor in the success of such mutual benefit and profit-sharing plans, to my mind, is the interest, enthusiasm, and staying powers of the man who launches it. Many a plan of the kind has been started, and failure has often resulted because of no one following it up. All approve in the abstract; but unless someone works in the concrete, failure may easily come. Interest flags, attendance falls off, and the scheme dies of dry-rot. The first year or two are the crucial period. If the plan survives these, it will last. Unless it is watched, nursed, and laboured with during that time by the gas company's manager—earnest enough, broad enough, patient enough to keep up interest, and do half the work for awhile—it will probably fail.

In the United States, the Company at Derby (Conn.) have a stockholding, partnership, profit-sharing plan. In Milwaukee, Grand Rapids, Madison, Ann Arbor, and doubtless some other places, a cash bonus profit-sharing plan has been in operation for some time, and with success. At Chester (Pa.), Lynchburg (Va.), Staten Island (N.Y.), and elsewhere, very successful employees' mutual benefit associations are in full swing; and at many places numerous provisions for the comfort and the pleasure of the men have been provided.

Before resuming his seat, Mr. Shelton read a long and interesting letter he had received from Sir George Livesey, in response to a request for information on the subject of the co-partnership system in operation in the South Metropolitan Gas Company.

THE MUNICH RESEARCHES ON LIGHTING SCHOOL AND LECTURE ROOMS.

Mention was made in the report of the proceedings at the recent meeting of the German Association of Gas and Water Engineers at Hanover,* of a communication by Dr. E. Schilling, of Munich, on the results of researches on the indirect lighting of school and lecture rooms by gas and by electric arc lamps. The researches were carried out at Munich by a Local Committee of scientific men, working in collaboration with the members of the Heating Committee of the German Association of Gas and Water Engineers. Their primary object was to demonstrate objectively to what extent gas lighting, in the present state of the art, is suited for diffused and semi-diffused lighting, and how it compares in respect of (1) distribution of light, (2) constancy, (3) hygienic requirements, and (4) cost with electric arc lighting affording equal illumination.

The Committee of Investigation comprised the following members: Dr. E. Voit, Professor of Electrotechnology at the Munich Technical College, Dr. M. Gruber, Professor at the University and Principal of the Hygienic Institute at Munich, Dr. O. Eversbusch, Professor at the University and Principal of the Ophthalmic Hospital at Munich, Dr. C. Seggel, a Munich surgeon, Herr H. Recknagel, a heating and ventilating engineer of Munich, Herr H. Ries, Manager of the Munich Gas-Works, and Dr. E. Schilling, a Munich civil engineer. Six other technical men assisted the Committee in their investigations. The report of the results of the work so far carried out must, it is stated, be regarded as merely provisional, and liable to revision to some extent as further researches are made. The figures and conclusions already published, however, are so valuable that it appears important to give at once the following digest of the comprehensive provisional report just issued by the Committee.

The experiments were carried out in two rooms at Munich. One was the lecture-room at the Forestry Research Institute, where the trials on semi-diffused lighting were made. This room was 41·8 ft. long, 26·2 ft. wide, and 12·45 ft. high. The illumination was observed at nine points in the room, approximately uniformly spaced over its area. The observations were made at a height of 3·61 feet from the floor level. The gas-lighting trials in this room were made with eight incandescent burners fairly uniformly spaced over its area. These burners were provided with semi-translucent screens or cups, 4 inches deep and 10 inches wide, by means of which a large proportion of the light was reflected upwards to the ceiling, which was about 40 inches above the upper edge of the screens. The test of the illumination afforded by these burners was made on Feb. 25 last, when the total gas consumption per burner, under a pressure of 16-10ths, amounted to 33·43 cubic feet per hour. The mantles had at the time been in use for 300 hours. Observations were made by three operators at each of the nine points chosen in the room. The mean of each observer's results was as follows: (*a*) 29·5, (*b*) 29·1, (*c*) 25·6 lux. The gas consumption for a mean illumination of 25 lux (about 0·19 English candle per square foot at 1 foot) would, therefore, be 29·77 cubic feet per hour for the room.

The electric lighting trials in this room were made with three Schuckert arc lamps on two separate occasions. On the first—Feb. 25—tri-connected lamps were used taking a current of 6·028 amperes at 110 volts = 6·63 hectowatts per hour. The means obtained by the three observers for the illumination were: (*a*) 30·6, (*b*) 31·0, (*c*) 26·1 lux. The consumption for a mean illumination of 25 lux would, therefore, average 5·68 hectowatt hours. On the second occasion—March 26—the trials were made with di-connected lamps, each taking a current of about 6 amperes at 38¾ volts, or a total of 7·07 hectowatt-hours, equal, at a tension of 110 volts, to 10·02 hectowatt-hours. The mean results observed were (*a*) 27·6, (*b*) 31·9, (*c*) 27·7 lux. The consumption, therefore, for a mean illumination of 25 lux, would average 8·61 hectowatt-hours. The arc lamps were suspended 10·8 feet apart, down the middle of the room, at a distance of 2·03 feet from the ceiling. They were each provided with a hemispherical semi-translucent screen or cup.

Comparing the results of these trials of semi-diffused lighting, it is to be observed that the illumination is considerably more uniform by gas than by electricity. In round figures, the mean illumination by gas was 28 lux; the maximum at any of the nine points of observation was 34·1 lux, and the minimum 23·3 lux. With the tri-connected arc lamps, the mean illumination was 29·23 lux, the maximum 50·6, and the minimum 19·5 lux. With the di-connected arc lamps, the figures were: Mean 29·07, maximum 48·6, minimum 18·4 lux. In respect of uniformity of illumination, therefore, gas lighting proved far superior to the electric arc lamps. The fluctuations in the illumination were also observed by readings being taken every 15 seconds by two observers at two different points over a period of 5 minutes. The extreme fluctuations observed (taking the initial illumination as = 100) were: With gas lighting, + 2 and − 6; with the tri-connected electric arc lamps, + 5 and − 10; and with the di-connected arc lamps, + 5 and − 10. In this respect also, gas lighting showed marked superiority. The falling-off in the illumination as the gas-mantles continued in use was also observed, and was found to be, after 300 hours 5·89, and after 600 hours 13·53 per cent. of the illumination afforded when the mantles were new. Special note was also taken of the flickering or twitching of the arc lamps. Each of the three tri-connected lamps twitched strongly, but momentarily, seven times in 5 minutes; while in the same period the di-connected lamps twitched on the average only twice apiece. The flickers were of too brief duration to admit of their intensity being observed photometrically.

Observations were also made of the relative advantages of the two modes of lighting from a hygienic standpoint. There were two ventilating flues in the ceiling of the room, which on one side had four windows, and on the other two doors; while there were four and two windows respectively in the two ends. With the ventilating flues closed, gas lighting caused an increase of 14·2° Fahr. in the temperature, and of 13·35 volumes of carbonic acid per 10,000 volumes of air in the room, as compared with increases of 12·1° Fahr. and of 2·9 volumes of carbonic acid in the case of the electric lamps. With the ventilating flues open, the corresponding figures were: For gas lighting, 13·0° Fahr., and 4·5 volumes; for electric lighting, 11·2° Fahr., and 0·8 volume. It will be convenient to consider the difference in the cost of lighting such a room by gas and electric lamps at the same time with the cost of lighting a larger room, such as that in which the rest of the researches were carried out.

The remaining researches were on diffused lighting, and were made in a drawing room at the Technical College at Munich. This room was 91·9 ft. long by 24·6 ft. wide, and 15 ft. 9 in. high. There were two ventilating flues in the ceiling; on one side there were six windows; on the other side one door, and one window at one end. The degree of illumination was measured at a height of 39·3 inches from the floor, at eighteen points, arranged in three rows of six, equidistant down the room. The tests were made at all points by three observers. The gas-lighting trials in this room comprised five series—one being with 52 incandescent burners, three with ten "Selas" gas-lights, and one with eight "Millennium" gas-lights. In this room, an illumination of 80 lux was taken as requisite for the draughtsman's work, and was aimed at in the trials. This is equivalent to slightly over 0·6 English candle per square foot at one foot. New mantles were used except in the case of the trial of ordinary incandescent burners, which were fitted with mantles that had been previously used for 300 hours. The results of the trials are recorded in the annexed table. The lights were each fitted with a reflecting cup-shaped screen, made up of eight enamelled plates supported in a suitable framing. The extreme width of this screen at the top was 31½ inches, depth 9·1 inches, with a central opening at base 6·3 inches wide, screened from below by a cap 11 inches wide, with inter-

* See "JOURNAL," Vol. LXXXVI., p. 944.

Trials of Diffused Lighting by Gas.

No. of Trial.	Description and Number of Burners.	Total Gas Consumption per Hour. Cubic Feet.	Pressure of Gas, or (Selas Light) of Gas-Air Mixture. Inches.	Illumination Observed.			Gas Consumption for Mean of 80 Lux. Cub. Ft. per Hour.
				Mean Lux.	Maximum Lux.	Minimum Lux.	
1	52 Incandescent (ordinary) mantles used for 300 hours	202·9	1·575	88·47	103·1	70·7	183·5
2	10 Selas, new mantles	131·4	33·5	84·03	95·2	73·4	124·7
3	10 " " " *	126·8	33·5	75·08	87·0	62·2	135·0
4	10 " " "	138·9	34·3	89·95	108·1	74·5	123·5
5	8 Millennium, new mantles	135·2	58·4	82·37	101·3	69·7	131·6

* At the close of this trial, it was observed that the burners were dusty, and not properly regulated. This doubtless accounted for the low results.

Trials of Diffused Lighting by Electric Arc Lamps.

No. of Trial.	Description and Number of Lamps (all Continuous Current).	Total Current taken. Hectowatt Hours.	Hectowatt Hours at 110 Volts.	Illumination Observed.			Current Required for Mean of 80 Lux. Hectowatt-Hours.
				Mean Lux.	Maximum Lux.	Minimum Lux.	
1	3 Siemens-Schuckert, at 12 ampères, normal position of carbons*	19·32	23·00	68·03	82·2	54·8	27·05
2	3 Körting and Mathieson, at 12 ampères, position of carbons reversed	17·73	21·98	104·03	132·9	79·9	16·90
3	3 Siemens-Schuckert, at 12 ampères, position of carbons reversed	16·89	21·37	93 77	115·7	75·2	18·23

* In this trial, the existing installation, designed for a mean illumination of only 50 lux, was used.

vening air-way for the inflow of air to the burner. The burner and screen were suspended by a rope and pulleys, so that the top of the reflector was nearly 30 inches from the ceiling; and the gas was supplied to the burner through a flexible connection.

The diminution of the light afforded with the period for which the mantles had been in use was also observed. In the case of the mantles employed with the ordinary incandescent burners in these tests, it was found there was no falling off in the illumination during the first 300 hours, but a diminution of 10·07 per cent. from 300 to 600 hours. The horizontal illuminating power with these mantles rose in the first 100 hours of use, but then fell; so that in 300 hours there was a net diminution of 4·85 per cent., and in 600 hours of 11·65 per cent., of the initial illuminating power. The "Selas" mantles fluctuated rather strongly in horizontal illuminating power; but at 100 hours the net diminution averaged only 3·47 per cent., and at 200 hours only 2·82 per cent., of the initial illuminating power. The "Millennium" mantles, on the other hand, showed a fairly uniform drop in horizontal illuminating power on continued use. Thus in 100 hours the falling-off was 3·64 per cent., and in 200 hours 14·06 per cent., of the initial value.

Three sets of trials of diffused electric arc lighting were made in the same room. The results are recorded in the above table. The screens used for reflecting the light upwards were slightly different in pattern in each of the three trials under consideration. The number of times each lamp twitched or flickered in a period of five minutes was observed. In the case of the Siemens-Schuckert lamps, with the normal position of the carbons, each flickered once only; but when the position of the carbons was reversed, two lamps flickered strongly four times, and the third five times, while five, six, and two feebler flickers were observed in the three lamps respectively. The three Körting-Mathiesen lamps flickered 49, 13, and 17 times in the five minutes.

The fluctuations in the illumination with diffused gas and arc lighting were observed over a period of five minutes by readings being taken every 15 seconds by two observers simultaneously at two points of the room. Representing the initial illumination as equal to 100, the extreme fluctuations recorded by either observer are shown in round figures in the following table:—

Diffused Lighting.—Fluctuations in Illumination.

100	Gas Lighting.			Electric Lighting.		
	Selas Light.	Selas Light.	Millennium Light.	Siemens-Schuckert. Carbons Normal.	Körting-Mathiesen. Carbons Reversed.	Siemens-Schuckert. Carbons Reversed.
	(1)	(2)				
+	6	2	5	0	3	12
−	8	6	4	14	5	11

Observations were also made of the hygienic conditions under the two modes of lighting. The two ventilating flues in the ceiling of the room were open or closed as recorded below. The steam-heating apparatus was in use throughout the trials, before each of which the room was thoroughly aired. The more important results are given in the following table:—

Diffused Lighting.—Hygienic Conditions.

Description of Lighting.	Ventilating Flues.	Persons in Room.	Rise in Temperature.	Increase in Proportion of Carbonic Acid in the Air.
			Deg. Fahr.	Vols. per 10,000 of Air.
Incandescent gas . . .	Shut	None	15·3	19·2
,, ,, . . .	Open	,,	20·5	2·1
Selas gas-light . . .	Shut	,,	7·7	22·3
,, ,, . . .	Open	,,	9·9	7·8
,, ,, . . .	,,	,,	15·7	0·8
Millennium gas-light . .	,,	51	11·6	9·1
,, ,, . .	,,	None	5·9	Nil
Electric arc lamps .	Shut	,,	6·5	1·8
,, ,, ,, . .	Open	51	11·0	11·7
,, ,, ,, . .	,,	None	3·8	0·7

The comparison of the cost of lighting by the various methods tried is made on the assumption that gas costs 5s. 8d. per 1000 cubic feet, and electrical energy 7½d. per Board of Trade unit. The mean result of the three trials was taken in the case of the Selas gas-light. It was computed that the lights would be in use for 275 hours in the lecture-room, and for 332 hours in the drawing-room. The consumption of mantles was based, in the case of the ordinary incandescent gas-burners, on the ascertained average for nine schools in Munich, which was at the rate of 0·7 mantle per burner per annum. The mantles were charged at 6d. apiece. The life of the mantles for the high-pressure burners was taken at 200 hours, which makes the consumption per burner per annum average 1·66 mantles; the price was 7·2d. each. Chimneys for the ordinary incandescent burners were taken to require renewal at the rate of 0·4 per burner per annum; price 3·6d. each. The high-pressure burners had no glass chimneys. The cost of carbons for the arc lamps was computed, from data furnished by the Siemens-Schuckert works, as follows: 6-ampère lamps (for semi-diffused lighting), di-connected, 0·42d.; tri-connected, 0·36d.; 12-ampère lamps (for diffused lighting), normal 0·67d., reversed, 0·59d., for, in all cases, the three lamps per hour. The electrical energy required for compressing the gas for the high-pressure gas-lights was as follows: Selas lamps, 135 watts; Millennium lamps, 198 watts. Attendance was assumed to be rendered by the man who looked after the heating and cleaning of the buildings, and in any case to be about equally needed for

Cost of Lighting for One Year.

Semi-Diffused Lighting, affording a Mean Illumination of 25 Lux, for a Lecture-Room 1076 Square Feet in Area. (Lights required for 275 Hours in the Year.)

Description and Number of Lights.	Cost of Energy.		Minor Charges.	Interest and Depreciation.	Total Cost.		
					Per Annum.	Per Hour in Use.	—
	£ s. d.	Ratio.	£ s. d.	£ s. d.	£ s. d.	s. d.	Ratio.
8 incandescent gas	2 6 4½	1·00	0 5 0	0 13 4¾	3 4 9¼	0 2·83	1·00
3 di-connected arc lamps	4 13 8½	2·02	0 10 10½	1 7 10	6 12 5	0 5·78	2·04
3 tri-connected ,, ,, ...	7 2 0¾	3·06	0 12 3	1 7 10	9 2 1¾	0 7·95	2·81

Diffused Lighting, affording a Mean Illumination of 80 Lux, for a Draughtsmen's Room 1615 Square Feet in Area. (Lights required for 332 Hours in the Year,)

47 incandescent gas	17 5 0	1·44	1 15 10	3 11 10	22 12 8	1 4·36	1·24
10 Selas gas	12 0 3	1·00	2 10 7¼	3 14 10½	18 5 8¾	1 1·22	1·00
8 Millennium gas	12 7 7¼	1·03	3 1 2	3 14 10½	19 3 7¾	1 1·88	1·05
3 Schuckert arc lamps, carbons normal	26 18 10	2·24	1 2 4	1 13 0	29 14 2	1 9·49	1·62
3 Schuckert arc lamps, carbons reversed	18 3 1¾	1·51	1 0 0¼	1 13 0	20 16 2	1 3·04	1·14
3 Körting arc lamps, carbons reversed.	16 16 7¾	1·40	1 0 0¼	1 13 0	19 9 8	1 2·08	1·06

the gas-burners and electric lamps. The meter-rents per annum were taken as follows: Semi-diffused lighting—Gas 1s. 3d., electricity, 2s. 7½d.; diffused lighting, gas and electricity each 3s. 9d. It was further assumed that the ceiling would require re-whitewashing once every two years with gas, and once every three years with electric light; making for a room of 1615 square feet area an additional outlay of 10s. per annum for gas lighting. The capital charges on the installations were computed on the assumption that the rooms formed part of a large building lighted on the same system. Charging depreciation at 4 per cent. on services, and 8 per cent. on engines and lamps, and interest at 4 per cent., the total annual charges were found to be as follows for rooms of the area stated—

Mode of Lighting.	Semi-diffused (Room 1076 Sq. Ft.).		Diffused (Room 1615 Sq. Ft).		
	Gas.	Electricity.	Gas.		Electricity.
	s. d.	s. d.	£ s. d. (a)	£ s. d. (b)	£ s. d.
Interest and depreciation charges . . .	13 4¾	27 10	3 11 10	3 14 10½	1 13 0

(*a*) Incandescent. (*b*) High-pressure.

On the basis of the data and assumptions stated in the foregoing paragraph and table, the total cost of lighting is computed for (1) a lecture-room of 100 square metres (1076 square feet) area by semi-diffused lighting, and (2) a draughtsmen's room of 150 square metres (1615 square feet) area by diffused lighting. The last table on p. 396 presents a summary of the results of the calculations.

With reference to the results of the trials, as reported in the table, the Munich Committee observe that the systems of lighting specially investigated were competent to afford, and did afford, the required degrees of illumination. Further, they were, speaking generally, capable of application for yielding even higher degrees of illumination. In the trials of semi-diffused lighting, gas afforded greater uniformity of illumination, owing to the larger number of sources of light employed. But in the lecture-room the higher benches were not sufficiently below the level of the lights. In the drawing-room, with diffused lighting, there was little difference in the distribution of the light between gas and the electric lamps with the carbons in the normal position. There was, however, greater want of uniformity with the electric lighting when the position of the carbons was reversed, owing to the smaller diameter of the circle of light projected from the lower carbon directly on to the ceiling. There were no sudden fluctuations of brightness, such as could be observed photometrically, with either mode of lighting. Flickering or jerking of the lights occurred to an objectionable extent with the tri-connected arc lamps for semi-diffused lighting, and anterior resistances should be inserted if this mode of lighting is used for schools or lecture-rooms. Arc lamps, with reversed carbons, gave more or less jerking, which was objectionable in proportion to its intensity and frequency. Gradual changes in the illuminating power could be measured; but they were mostly within the limits of error of observation, and so small as to have no practical significance.

The falling off in illumination caused by the continuance in use of mantles was practically small. Shadows were only noticeable with the semi-diffused lighting. In unoccupied rooms, electric lighting did not appreciably affect the composition of the air; but in unventilated rooms, gas lighting caused a considerable increase in the proportion of carbonic acid within a short time. Gas lighting also resulted in a greater rise of temperature. On the other hand, the trials demonstrated that the most primitive ventilating arrangements suffice to put gas lighting in a position to compete with electricity in regard to absence of vitiation of the air and rise of temperature, especially in occupied rooms. There is no objection at all, on hygienic grounds, to the use of incandescent gas burners for the indirect lighting of drawing-rooms, &c., provided the lights are near the ceiling, and provision is made for the removal of the products of combustion.

The cost of lighting, taking gas at 5s. 8d. per 1000 cubic feet, and electrical energy at 7½d. per Board of Trade unit, is two to three times as great by electricity as by gas, if semi-diffused lighting is used to give an illumination of 25 lux, and the cost of gas and electrical energy only is taken into account. Similarly, an illumination of 80 lux by diffused lighting is most cheaply obtained by high-pressure gas lighting; the arc lamps being 1½ to 2½ times as dear. But if all subsidiary and incidental charges are taken into account, in addition to the mere cost of gas and electrical energy, then for the semi-diffused lighting (25 lux), electric arc lamps are 2 to 2·8 times as dear as incandescent gas-burners; while for the diffused lighting (80 lux), arc lamps with reversed carbons become practically as cheap as high-pressure gas-lights.

Leyton District Council Electricity Bill.—In the paragraph of "Electric Lighting Memoranda" dealing with this Bill in last week's "JOURNAL," it was stated that "it had transpired that one effect of the imposition of the Bermondsey-Northumberland clause has been that the District Council have since withdrawn the free-fittings clause." This was a misunderstanding. The statement applies to the Ilford District Council's Bill; and it is the original Bermondsey clause that was inserted in the Bill, and not the Northumberland form.

REGISTER OF PATENTS.

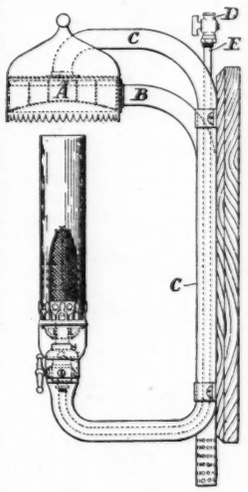
Gas and other Internal Combustion Engines.—Clerk, D., of Ewhurst, Surrey, and Bickerton, H. N., and Bradley, H. W., of Ashton-under-Lyne. No. 8088; April 7, 1903.

This invention relates to gas or oil engines in which the cylinder is charged at a pressure exceeding the atmospheric pressure, so that, when compression is completed, higher compression pressures are obtained with given clearance or combustion space volumes. The object aimed at is to produce internal combustion engines in which high average pressures are obtained with low maximum and mean temperatures, and also "to improve the operation of such engines so as to enable them to run smoothly at high speeds."

The patentees propose to add to the charge of an internal combustion engine working on the "Otto," "Clerk," or other cycle using compression, either before, during, or near the end of the compression stroke, a charge of steam in such a way as to increase the compression pressure without diminishing the volume of ordinary combustible mixture, whereby the weight of the total charge present is increased and an impulse is obtained with decreased maximum and mean temperatures and also increased mean pressures. To effect this, they add to the charge of (say) an "Otto" cycle engine a supply of steam under such pressure as to increase the total weight of gaseous matter present in the cylinder before compression begins. This steam is to be added after the ordinary charge is drawn in to the "Otto" cycle cylinder in such a way as to increase the pressure before compression, without diminishing the volume of the charge admitted. The mixed inflammable charge and steam is then compressed, and an impulse is produced by explosion in the usual way—the maximum temperature, however, being reduced, while the mean pressure is increased.

Incandescence Lighting Apparatus.—Tolson, J., of Toorak, Melbourne. No. 15,952; July 18, 1903. Date claimed under International Convention, July 30, 1902.

This invention refers to an arrangement whereby the heat liberated or generated by the combustion of the illuminant is utilized as far as possible in imparting additional thermal energy to the air and the illuminant about to be consumed—"rendering them more fully available for the production of light and so reducing the cost of lighting." It also comprises an arrangement of a chimney, perforated to admit currents of heated air to its interior, and means for directing the currents through its perforations. By this means, the incombustible constituents of the air that issue through the mantle, the partially consumed gases or vapours, and the products of combustion that are formed within the mantle and also issue through the mantle—all of which tend to form a layer more or less obstructive to further combustion—are broken up and mixed with the unburnt air. This breaking up or mixing of any unburnt or partially burnt particles of gas or vapour and air "allows of their combining more rapidly and readily, at or near the surface of the mantle, with the oxygen supplied through the perforations in the chimney, thereby increasing the incandescence of the mantle." The invention also comprises the application of a baffle (called a disc) above the holes which admit air into the bunsen burner; so that, by raising or lowering the disc, a smaller or larger portion of the current of heated air passing through the burner case is deflected into the burner inlet holes, while the correspondingly larger or smaller portion of the current of heated air enters the chimney suitably, at right angles.



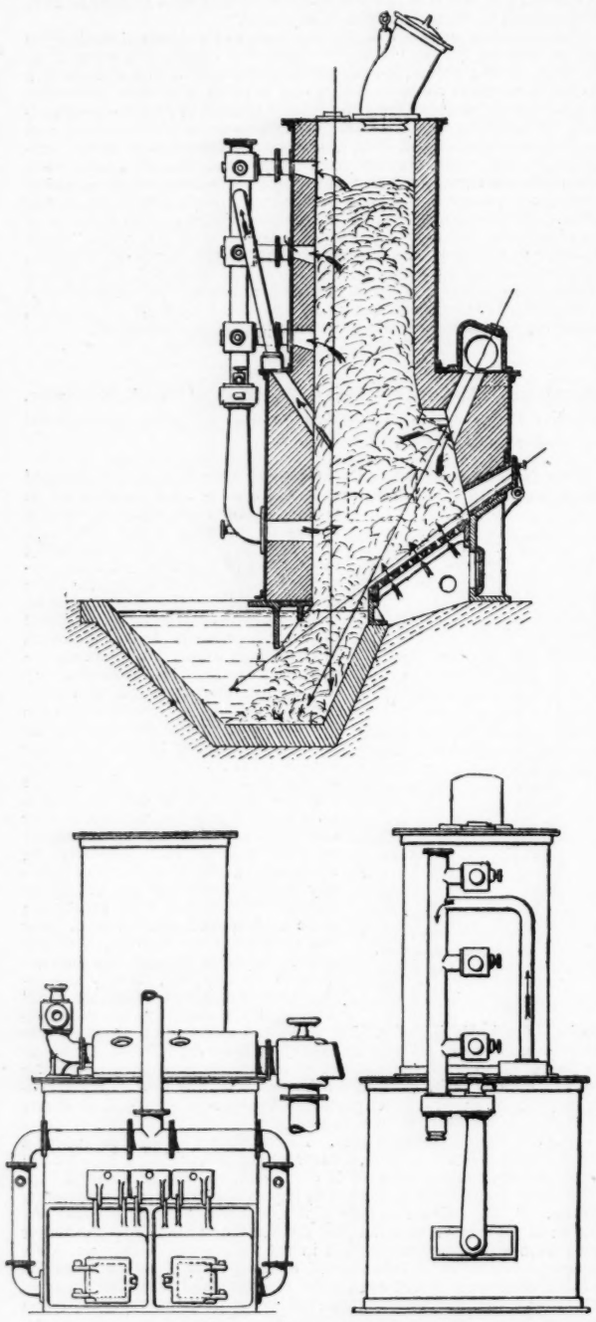
A is the regenerator or heater. It comprises a helical box having a downwardly concave bottom, a cover which prevents leakage, a helical wall whereby the incoming air is circulated, and an ornamental cap. The cover (kept down by fasteners) is provided with a non-conducting lining. B, the cold-air supply pipe (connected with A), is below the outlet of the burner, in order that the heating of the air in the heater may have a tendency to produce in the air-passage a current of air flowing towards the burner instead of away from it, as would be the case if the burner orifice were below the other end of the air-passage. C is the hot-air supply pipe, attached to the cover of the heater and entered by the illuminant-supply pipe E. The space between the outlet end of the hot-air pipe C and the chimney J is enclosed, so that any inflow of unheated air is prevented. D is the gas-supply tap in the pipe E, a portion of which is surrounded by the hot-air pipe C. The pipe E is connected with the bunsen burner, which is provided with air inlets and over which is fitted the mantle.

The cold air on entering passes through the pipe B, and, entering the heater, will circulate therein and issue into the pipe C. Since the heater absorbs heat from the gases issuing from the chimney, the air passing through the apparatus as described becomes highly heated; and the hot air in C envelops the illuminant pipe E, and during its course to the burner heats the gas contained therein. Heated air and gas then enter the mantle through the burner in the usual manner, and a portion of the heated air passes up to, and envelops the exterior of, the mantle.

Production of Water Gas, Producer Gas, and the Like.—Schmidt, P., of Hanover. No. 24,935; Nov. 16, 1903.

This invention has for its object an improvement in the working of generators in which, by means of a steam injector, the gases containing tar generated above the body of fuel and in the upper zones of the latter are drawn off and injected in the lower hottest part of the fuel column for the purpose of effecting their decomposition and conversion into carbon monoxide and other permanent combustible gases.

It has been shown (the patentee remarks) that in the working of such generators or producers a series of disadvantages arise. The gases generated in the upper part consist to a large extent of heavy, easily condensable hydrocarbons that condense more or less in the pipes conveying their gases to the lower part, and therefore pass in a liquid condition in the lower part of the fuel column. By this means, a very



great amount of heat is lost; the fuel being considerably cooled down on the side where the introduction of the liquid hydrocarbons takes place, as can easily be seen through sight-holes—the fuel being much darker near where the liquid enters than at a distance away, and is consequently of a lower temperature. A portion of the liquefied gas also drops down into the water-seal of the apparatus and is lost. The consequence of the unequal degree of combustion resulting is the formation of cavities in the body of fuel, and, consequently, want of uniformity in the production of combustible gas, and an unequal descent of the fuel.

These disadvantages are said to be obviated according to the present invention by preventing the condensation of the tarry gases drawn off from the upper layers of fuel, on their way to the lower layers, by maintaining them during their transit at a high temperature by means (either directly or indirectly) of highly-heated gases or vapours. This can be effected (say) by causing generator gas to pass from the hot zone of the generator by a suitable channel into the pipe through which the gases and vapours given off at the upper part descend to the lower strata, so as to be directly mixed with such gases or vapours; or the hot generator gases may be made to pass through a jacket surrounding the pipe, on their way to the place of utilization.

This method of operating can only be employed with advantage, it is remarked, if the central inverted V-shaped fire-grate heretofore generally employed is replaced by a lateral inclined grate, arranged opposite the part of the combustion chamber where the downward conducted gases enter, so that the air currents entering through the fire-grate and the injected hydrocarbon vapours impinge upon each other at an angle of about 90° in the zone of incandescent fuel, so as to effect their intimate mixture and a perfect conversion of the hydrocarbons into carbon monoxide and other permanent gases.

By this arrangement of inclined grate, the further advantage is claimed to be obtained, as compared with gas-generators with V-shaped grate, that the hydrocarbons which are led downwards to below the gas outlet can no longer ascend along the walls of the chamber so as to escape undecomposed through the gas outlet.

The engravings show a vertical transverse section of one arrangement, a front view, and a back view.

The gas-generator is constructed (as shown) with a number of escape channels in the upper layers of the fuel column and also in the space above the latter, which channels communicate with one and the same down-draught pipe. The gases are drawn down the latter and injected into the lower hottest zone of the fuel column by means of a steam-injector. From this zone a pipe leads up into the upper part of the down-draught pipe, so that a portion of the highly-heated gases are drawn up from this zone so as to mix with the colder gases containing tar decending from the upper layers, and in thus imparting more heat thereto prevent condensation by cooling during the descent. The gases and vapours are drawn off from all the different zones by means of a single injector; the branch pipes being provided with dampers or valves, in order that the quantity of gas drawn off from each zone may be separately regulated.

Self-Sealing Retort-Lids.—Barker, J., of Leven, N.B. No. 27,121; Dec. 11, 1903.

This invention relating to self-sealing retort-lids has for its object to provide means for simultaneously pressing and sliding the lid against its seat, so as to clear the two surfaces of extraneous matter.

Fig. 1 is a face view of the mouthpiece and its lid—closed, but not sealed. Fig. 2 is a plan of fig. 1. Fig. 3 is an enlarged view of the lid, showing the pad and lever which closes the lid. Fig. 4 is a section showing the pad and lever. Fig. 5 is a similar view in which a steel cup is shown in the boss of the lid.

The face of the retort is made quite flat and true in the usual manner; the lid face being similarly treated. Projecting from the side of the mouthpiece is a bracket to which is hinged a lever A, which can

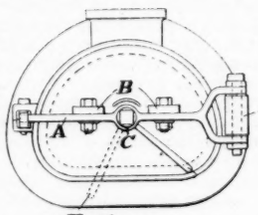


Fig. 1.

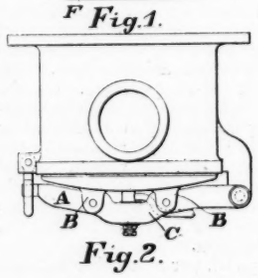


Fig. 2.

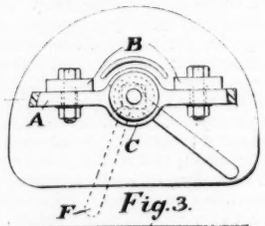


Fig. 3.

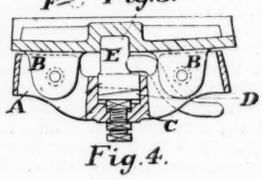


Fig. 4.

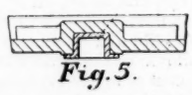


Fig. 5.

operate in a horizontal plane—passing through the axis of the retort, its free extremity being arranged to engage with a catch hinged to the opposite side of the retort. On the lid are two snugs B, placed to lie against a side of the hinged lever; and by means of bolts or pins the lid is loosely attached to the lever—that is to say, the lid, while carried by the lever, is free to move slightly relative to the lever. Coinciding with the axis of the retort, when the lever is in position across the mouth of the retort and the lid (as shown), is a nave or boss C; while opposite it is a suitable cylindrical cavity in the exterior of the lid and placed eccentrically to the axis of the retort. This cavity may be as shown in fig. 4; or it may be in the form of a steel cup (fig. 5); or else a bracket having a cavity formed in it may be bolted to the lid. The boss in the lever has a cylindrical cavity preferably of larger diameter than that in the lid. At the innermost end of the cavity in the boss is a pad D, having an inclined face. The pad, while free to be adjusted longitudinally by means of a set screw working in the boss of the lever and held in position by means of a jam nut, cannot rotate, because of a square projection which fits into a corresponding recess. Fitting into the cavity in the lever boss and the eccentric cavity in the lid is a shaft or pivot E; the end next the inclined pad being also inclined. At or about its middle is a handle whose purpose is to provide means for causing the shaft to partially rotate.

Assuming the lid to be turned away from the retort-mouth—that is to say, to one side and supported by the hinged lever A—and it is desired

to place the lid against the mouth of the retort, the lever, and with it the lid, is moved on the hinge until its free extremity engages with the hinged catch, at which time the lid is loosely covering the mouth of the retort. The central shaft or pivot E, with the eccentric bearing and inclined face, is then partially rotated by the handle to about the position F, with the result that the lid is pushed forward against the face of the retort by the action of the fixed and rotatory inclined planes at the one end and simultaneously made to slide against the face by the action of the eccentric bearing at the other—thus cleaning the faces as they are being pressed together.

Atmospheric Gas-Burners.—Gross, F., of Schöneberg, Germany. No. 19,519; Sept. 10, 1903.

This invention relates to gas-burners for incandescent light—more especially to a device for preventing back lighting or flashing of the flame at the air inlet, and yet not offer any resistance to the gas and air passing through the burner.

The constructions hitherto used for the purpose, the patentee remarks, mostly consisted of flaps arranged in front of the gas-pipe, which closed if no gas were supplied, and were opened by the current of gas itself; but the great disadvantage was that these flaps offered considerable resistance to the gas, so that it was impossible for a sufficient quantity of air to be carried along by the current of gas, "as in case of a flap which is large enough to allow a sufficient quantity of gas and air to pass, the relatively small quantity of gas impinging upon the flap was mostly not sufficient for opening the flap far enough to allow the necessary quantity of air to be taken along by the gas."

The device suggested consists of a non-return valve situated in the path of the gas and air mixture, and provided with means tending to hold it open in such manner that the valve only closes the passage to the gas-nozzle when back-pressure occurs in the burner.

Incandescent Gas and Analogous Lighting.—Darwin, H., of Erdington, near Birmingham. No. 15; Jan. 1, 1904.

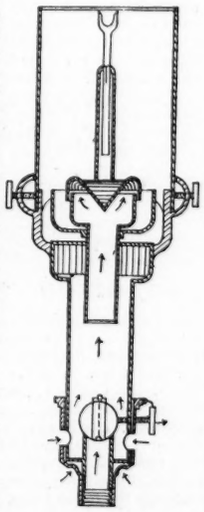
This invention has reference to incandescent lighting apparatus, and is applicable to various atmospheric burner systems in which gas, oil-vapour, or the like is mixed with air before being delivered to the burners.

The invention consists principally, in the first part, in providing, in connection with lighting appliances of this class, means for supplying to, and thoroughly incorporating or intimately mixing with, the ordinary or primary combustible mixture of atmospheric air and gas or vapour, an additional or secondary air supply; and, incidentally, in regeneratively utilizing the heat radiated from the burners of pendant or the like kind for raising the temperature of both the primary mixture and the additional air supply, and also the complete mixture, so that the latter is subjected to a preliminary heating before being delivered to the burners. The effect of this preliminary heating, and the complete incorporation of the additional air supply, is said to be to greatly increase the temperature developed on combustion of the mixture; so that, when the mixture is burnt in contact with an incandescent mantle for lighting purposes, an "intensified illuminosity" is obtained.

The second part of the invention consists in the provision, in connection with the mantles of incandescent lamps, of special distributing burners or devices for distributing or spreading the combustible mixture evenly over the whole of the mantle and enabling the mixture to be thoroughly burnt in contact with mantles arranged in inverted or any other positions.

Incandescent Gas-Burner.—Hall, W., of Manchester. No. 2654; Feb. 3, 1904.

This incandescent gas-burner (fitted with a side and down shock anti-vibrator) consists of a steel circular spring, so fitted as to support the centre position of the burner, mantle-holder, and protector. The burner is also fitted with an adjustable nipple regulating the gas supply, consisting of a small brass ball which rests immediately on the end of the gas inlet pipe, and is held in position and made gas-tight by a brass belt passing over the ball. The ball itself has a series of holes of various sizes drilled through the centre—one hole being drilled through the upper portion, so that, to obtain the proper quantity of gas, the ball merely requires turning round. The burner top is made (as shown) so as to direct the gas to the sides of the mantle; while the mantle-support is made telescopic to allow the mantle to be raised or lowered at will. This allows the cleaning of the gauze or the lowering of the mantle when it becomes broken away at the bottom.



Gas-Lighting Apparatus.—Rostin, H., of Berlin. No. 7289; March 26, 1904. Date claimed under International Convention, April 29, 1903.

This gas-lighting apparatus is of the class in which the gas issuing from the burner is lighted by a constantly burning auxiliary or bye-pass flame. For admitting the gas from the conduit to the burner, a valve or cock must be opened; and the invention consists in providing means for opening the valve or cock from any suitable distance—for instance, from the gas-works—and thus dispense with the necessity of lighting every single lamp or lantern separately. The apparatus is of the kind in which the valve or cock of the burner is opened and closed through the agency of a bell arranged in proximity to the burner; the bell being lifted from its normal position by an increased pressure of gas temporarily made to flow through the conduit from a station or from the gas-works.

Convertible Gas Cooker and Heater, and Improved Fittings for Same.—Cox, G. J., of Balwyn, Melbourne. No. 8151; April 9, 1904.

This invention relates to "improved forms of combined apparatus constituting what is commonly called a gas-cooker, and fittings for same, and whereby the utility of such apparatus may be considerably extended and auxiliary fittings applied in such a manner that, in addition to affording special facilities for manipulating the various cooking operations usually done by such apparatus more conveniently and more economically, and for cleaning the oven and for adjusting and cleansing the burners and fittings connected with the apparatus, and for the further utilization of the heat leaving the oven and providing more suitable and cleanly air supply to the oven, the oven-chamber, and suitable auxiliary apparatus, may also be easily arranged to provide heat for domestic purposes other than for cooking operations." All of this is "fully set forth and shown" in a detailed specification extending to 14½ printed pages with 20 claims detailed in a further three pages, and with four sheets of drawings, to which readers who are specially interested in the subject must be referred.

Incandescent Burners.—Schneider, E., and Lachmann, L., of Berlin. No. 8707; April 15, 1904.

This invention comprises a burner, to be used as an ordinary incandescent gas-burner or as an oxygen intensive burner; the invention consisting more particularly in the peculiar construction of the cock or tap, which may be adjusted to feed gas alone or gas and oxygen to the burner as desired.

APPLICATIONS FOR LETTERS PATENT.

13,195A.—Vaughan-Sherrin, J., "Gas engines." July 22.
15,883.—Warry, J., and Wigley, P., "Inverted Incandescent gas lights." July 18.
15,884.—Milne, J., and O'Connor, H., "Lighting incandescent burners in street-lanterns." July 18.
15,885.—Milne, J. and O'Connor, H., "Testing gas." July 18.
15,886.—Worsnop, C. H., "Ventilating lamps." July 18.
15,908.—Reichwald, A., "Production of combustible gases from bituminous fuels." A communication from Fried. Krupp Aktiengesellschaft. July 18.
15,937.—Boaler, E., "Mantles." July 18.
15,953.—Lienert-Market, E., "Pipe-unions." July 18.
15,977.—Povey, H. W., and Shakespeare, G. A., "Acetylene generators." July 19.
15,996.—Zechnall, L., "Incandescent burners." July 19.
16,008.—Koppers, H., "Coke-ovens." July 19.
16,011-2-3.—Albertini, P., "Internal combustion engine working with a two-stroke cycle." July 19.
16,016.—Ham, F. G. S., "Connecting branch-pipes to mains under pressure." July 19.
16,067.—Grice, H. J., "Gas producers." July 20.
16,069.—Smith, H. E., "Gas-producer." July 20.
16,073.—Zimmer, G. F., "Conveyors." July 20.
16,122.—Maul, J., "Gas-pressure regulators." July 20.
16,156.—Galbraith, J., "Acetylene generators." July 21.
16,194.—Wilton, G., "Conveying and quenching coke." July 21.
16,201.—Lucas, A. W., "Incandescent lamps." July 21.
16,223.—Dempster and Sons, Ltd., R., Broadhead, I. W., and Ordish, F. W., "Discharging gas-retorts." July 22.
16,231.—Bolle, C., "Retort-charging machines." A communication from C. Eitle. July 22.
16,288.—Aktiengesellschaft Fur Selas-Beleuchtung, "Production of mixtures of gas and air." July 22.
16,427.—Browne, A. F., and M'Kinlay, R., "Subjecting gases or vapours to the action of liquids or liquid agents or vapours therefrom, especially applicable for washing or scrubbing or enriching illuminating or other gases, and for 'recovery' purposes." July 25.
16,460.—Clarke, H., "Incandescent lighting." July 26.
16,530.—Dickison, A. S., "Gas-engines." July 26.
16,558.—Kent, W. G., and Binnie, W. J. E., "Water-meters." July 27.
16,562.—Nice, M., "Gas-stoves." July 27.
16,567.—Freel, H., and Lemon, J., and Son, "Generation and purification of acetylene." July 27.
16,593.—Hemingway, H. W., and Booth, R., "Washing or purifying gas." July 27.
16,614.—Wood, E. S., "Holding mantles." July 28.
16,638.—Douglas, J. T., "Internal combustion engines." July 28.
16,655.—Penzer, W. G., "Acetylene generator." July 28.
16,658.—Bateman, F. E., "Mantles." July 28.
16,701.—Luby, J. H., and Harris, W., "Acetylene generator." July 29.
16,712.—Hughes, H. K., "Gas-pendants." July 29.
16,722.—Hinton, E., and Andrews, F. A., "Gas-controlling devices." July 29.
16,763.—Boutillier, L., "Producing poor gas free from tarry matters." July 29.
16,765.—Kirkham, Hulett, and Chandler, Ltd., and Hersey, S., "Washing or scrubbing gas." July 29.
16,766.—Colson, A., "Manufacture and purification of illuminating gas." July 29.
16,781.—Allman, W., and Watson, J. H., "Incandescent burners." July 30.
16,782.—Bateman, F. E., "Incandescent burners." July 30.
16,805.—Arculus, E. A., and Wigley, P., "Holding globes." July 30.
16,831.—Browne, A. F., "Charging, discharging, and operating gas-retorts." July 30.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Carburetted Water Gas for Incandescent Lighting.

SIR,—It seems to me, from the particulars given in the article on the above subject in the last number of the "JOURNAL" (p. 332), that the experiments carried out by Drs. Schmidt and Leybold at the Hamburg Gas-Works are fallacious. In my opinion, based on a large number of experiments, the duty of a good ordinary Welsbach burner is much above the 19 candles per cubic foot of (say) 14-candle gas found by the German Doctors to be its best results. But these cannot be attained when the burner is made to consume 3·71 cubic feet under 1 inch pressure. The burner should have been arranged to consume about 3·30 cubic feet, under 1·4 inches pressure; and then the experimenters would have found an illuminating power of at least 75 candles and a duty of over 22 candles per cubic foot.

The sentence quoted on p. 333, that "the increase in the pressure of the gas, from 1 inch with coal gas to 1·6 inches with 60 per cent. of water gas, cannot *per se* have exerted any appreciable influence on the illuminating power," &c., is, in my opinion, absolutely incorrect, and should be contradicted. On the contrary, it is almost certain that the better result obtained with the coal gas mixed with water gas, as shown by the experimenters, is due solely to the increased pressure. Not, of course, that the pressure influences *per se*, but because it is a means of bringing to the burner a larger quantity of air.

All our experiments have led us to the following conclusions, which I can give with confidence as being correct: (1) In each case, and with any sort of burner, the best results are attained when the quantity of air drawn in, either through the bunsen pipe or into the glass chimney, is, as far as circumstances allow, exactly equal to the quantity of air required for the complete combustion of the gas. (2) Comparing burner with burner, the best results are attained by the one that draws in the larger quantity of air by the bunsen; the quantity of air drawn in by the glass chimney being lessened accordingly.

It is not without some surprise that I see in the tables given in the "JOURNAL" that the experimenters found for each increase in the pressure of 1-10th of an inch an equal increase of some 17·5 hundredths of a cubic foot of the quantity of gas burned, irrespective of the increasing specific gravity of the gas under pressure. The natural laws are that the quantity of gas issuing from an aperture varies as the square root of the pressure, divided by the specific gravity of the gas; so that the quantity must be lessened gradually with increasing pressures and density. These laws the experimenters cannot have upset; and therefore I consider the tables inaccurate, at least with regard to the figures showing the pressures of the gas. But, of course, the value of the whole work is lowered accordingly. I will nevertheless draw some conclusions from the figures in the tables, giving the actual consumptions of gas, the proportion of water gas used, and the duty found per cubic foot.

Let us remember another natural law bearing upon the present question—viz., that the quantity of air drawn in (in this case into the bunsen pipe) by the outflow of the gas from the nipple of the burner increases in the ratio of the pressure or velocity of the issuing gas, and also of the specific gravity of the gas, or, in one formula, according to the pressure multiplied by the specific gravity. This being the law, it is no wonder that the experimenters in Hamburg did get better results with a mixture of coal gas with 60 per cent. of water gas or a composed gas of (say) ·52 specific gravity, aided by 1·6 inches of pressure, against coal gas of ·40 specific gravity under 1 inch pressure. The reason for the better result I have already stated; it is attributable solely to the larger quantity of air drawn into the bunsen pipe by the heavier gas.

The only conclusion one can draw from the experiments as presented and from the figures given in the tables is that the Welsbach burner experimented with was in bad condition for coal gas, having too large holes in the nipple, and therefore being incapable of sucking in a sufficiently large quantity of air at the bunsen. This defect the addition of heavier gas (water gas) remedied; and, as can be seen from the tables, the results became better progressively with the quantity of water gas used.

Had the experimenters first tried to find the best conditions under which to work with an ordinary Welsbach burner using pure coal gas, they would have obtained a much higher duty for coal gas, and thus would have upset the whole of the conclusions they have come to by having started with a bad burner.

J. D. B.

Aug. 5, 1904.

A Gasholder and Preferential Treatment.

SIR,—I have read Mr. Hunt's letter on this subject in your July 26 issue. While I suspect that the "JOURNAL" is not open to political controversy, I should just like to say that I know of another Colony—the Transvaal—which has given preferential treatment to the Old Country for a large gas-producer plant. Though the order has been secured by German patentees, the work is specified to be made in England. Surely Mr. Hunt does not expect the preference to be all one-sided. The small tax on foodstuff would only be for a short time, till the virgin soil could be profitably cultivated. Again, were taxes put on food, they would be taken off something else. Mr. Hunt would no doubt rejoice if 6d. in the pound were taken off his income-tax.

I think all honour is due to Mr. Featherstone, who made such a long journey to secure an order for his firm and his country, but chiefly for the benefit of his workmen, who can now look forward to cheerful firesides at Christmas and full work during the winter months. Surely these people would not object to pay a fraction of a penny extra for a loaf of bread or a pound of beef.

I contend that it is the duty of every country to protect itself and find employment and contentment for its children, and to give preference and help to its kindred in the Colonies across the seas which have been acquired at such great sacrifices. Mr. Hunt should remember that the more money we spend among ourselves, the more prosperous he and we shall become. Money sent out of the country to pay for goods we can make ourselves, no matter what the price, is capital lost to us for ever. Mr. Chamberlain, who, in my opinion, is our most far-seeing statesman, will carry his scheme in spite of all the misrepresentations of Little Englanders.

A. GIBSON.

Wood Green, N., July 28, 1904.

PARLIAMENTARY INTELLIGENCE.

GLEANINGS FROM THE COMMITTEE ROOMS.

The Northumberland Clause. THE Rhymney and Aber Valleys Gas and Water Company and their Manager (Mr. Albert R. Cawley) were not to be satisfied by the refusal of a Commons Committee to insert in the Caerphilly Electric Lighting Order the Northumberland modification of the Bermondsey clause; and a fortnight or so after saw them back again appealing to the Lords for the protection that the Lower House denied them. The Company are now wondering, and they will not be alone in their mental exercise, why—the Duke of Northumberland having recently gone so carefully into this matter in connection with other Orders, and given the clause so freely to those who asked for it—they (the Rhymney Company) should not have been granted what the fortunate Companies who appeared before the Duke's Committee secured from them. The Rhymney Company deserved for their tenacity of purpose better fortune; but the ways of these Parliamentary Committees are inscrutable. We look for a reason for the refusal; and the only one that presents itself is that a witness named Corbett gave the Committee to understand that he had in his opposition to the insertion of the clause the support of Lord Bute. It was not very clear, however, how far this was the case; but whether it was the case or not, it is a shameful thing, if the support of a single nobleman—however great his position—can produce, without proper consideration, a certain decision merely because it is his will. But why this difference between the group of Orders recently passed and the Caerphilly one? When the Bill was before the Commons Committee, we looked into the matter, and failed to see why there should be any distinction. On the contrary, it was found that there were special grounds why the protection of the Northumberland clause should be granted.

Reasons Why. In the first place, the District Council are under an obligation to take from the South Wales Electric Power Company 50,000 units a year at 1½d. per unit; and to this there are to be added the costs of transforming and of distribution. What the distribution costs will amount to are an unknown quantity, in view of the fact that it is a peculiar district to serve, being mountainous and containing a very poor population. Now this means that the District Council must do a business equal to 50,000 units, or there will be a loss, which will come upon the ratepayers. What are the chances of the business being obtained? It is a poor district, containing for the most part colliers' cottages letting at from 5s. to 6s. a week. As it is estimated that it would take something like £5 to wire and fit up these cottages, the opportunities for doing business in them look rather remote, while the speculation into which the Council are so easily drifting looms up menacingly. The costs of distribution, too, have been mentioned. The Council are taking powers to lay their cables over mountains and common lands, some 800 feet above sea-level; so that the cost of the transformed electricity—say, 2d. per unit—is far from the price they will have to charge. We fear the shopkeepers and the poor people of the district will look long at the price per unit that will have to be charged before they will be booked as consumers. Already the rates are 7s. in the pound; and the population in the whole area does not exceed 10,000. Few can doubt, on considering these matters, that the day will come when the ratepayers will wish with all their hearts that the Gas and Water Company had been successful with their petition. Speaking of this Company, they have been busy carrying out the duties that Parliament entrusted to them in 1898. The first matter to which they devoted themselves was the water supply of the district. There was a lot of work to be done; but they have laid water on to all the places concerned. Since 1899, the Company have raised £160,000, have constructed three reservoirs, and laid miles of mains. As yet the gas supply is only in one of the three towns in the district. Water was the first consideration; and they have done their duty thoroughly up to the point that they have reached in their progress. This augurs well for a continuation of the Company's forward policy.

Selby and Leeds. The trouble which has arisen this session between Selby and Leeds cropped up again in one of the Lords' Committee Rooms the other day; and it has ended in a threat from the Leeds Corporation that they will call upon Selby to meet them on practically the same fighting-ground in a future session of Parliament. The Corporation were the only petitioners against the Bill of the Council; and the single relevant point which they were seeking to make was in respect to a well that Selby proposed to sink. This well, Leeds say, is within 2½ miles of one of their pumping-stations; but though Leeds (so Mr. Wedderburn, K.C., stated) had no *locus standi* on the question of the wells, because they were not landowners, he willingly included their well in a protective clause, notwithstanding that, according to the contentions of Selby, it was 100 yards outside the 2½-mile radius. The real secret, however, of the Leeds opposition is that they are afraid they will be unable to use the Gateforth Estate as a sewage farm if Selby get their water supply in that district. Mr. Balfour Browne, K.C., tried hard to obtain a hearing on this point; but their Lordships would only admit of a discussion respecting the well. Under these circumstances, the learned Counsel, in face of the offer of Mr. Wedderburn, had no cause to proceed further; but he gave Selby plainly to understand that Leeds intended to apply

next session, or the one after, for power to utilize the Gateforth Estate (which cost them £85,000) for sewage purposes. Meanwhile, the Selby Bill proceeds.

Oakengates, &c., Joint Water Board. When the Bill of the Oakengates, Dawley, and District Joint Water Board was first presented to the House of Lords, it proposed the constitution of a Joint Water Board, drawn from the District Councils of Oakengates and Dawley, and the Rural District Councils of Wellington and Newport, and, of course, dealt with other matters appertaining to water supply, as described in previous references to the Bill. When the Bill was before the Lords, the Hadley and Wellington rural districts were excluded from the limits of supply of the Joint Board; and the only discussion on the Bill, before the Unopposed Committee of the Commons a few days since, related to the contributions these two districts should make to the costs of the promotion of the Bill, to which they were parties up to a certain stage. The Local Government Board proposed, after the Lords decision, to make a proportion of the costs special charges on the two districts, instead of allowing the money to be raised by a general rate over the whole of the area rated by the Wellington Rural District Council. The Parliamentary Agent for the Hadley Council objected to this alteration being made; and the Committee restored the clause to the form in which it left the Lords.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill read a second time: Leeds Corporation (Consolidation) Bill.

Bills read the third time and passed: Rotherham Corporation Bill, Selby Urban District Council Bill.

Bills Royal Assented: Arbroath Water Order Confirmation Bill, Dumbartonshire (Vale of Leven) Water Order Confirmation Bill, Dunfermline District Water Order Confirmation Bill, Ebbw Vale Urban District Water Bill, Harrogate Water-Works Tramroad Bill, Lytham Improvement Bill, Melrose District Water Order Confirmation Bill, Thurles Urban District Council Water Bill.

The Edinburgh and District Water Order Confirmation Bill has been read the first time, and, pursuant to the Private Legislation Procedure (Scotland) Act, 1899, deemed to have been read a second time and reported.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Lords Bills reported: Gas Orders Confirmation (No. 1) Bill, Water Orders Confirmation Bill.

Bills read the third time and passed: Edinburgh and District Water Order Confirmation Bill, Gas Orders Confirmation (No. 1) Bill [Lords], Gas and Water Orders Confirmation Bill [Lords], Leeds Corporation (Water-Works) Railway Bill [Lords], Manchester Corporation (General Powers) Bill [Lords] Water Orders Confirmation Bill [Lords].

ELECTRICITY SUPPLY FOR CAERPHILLY.

A Bill to confirm a Provisional Order made by the Board of Trade to permit the Caerphilly Urban District Council to supply electricity for lighting purposes came last Tuesday before a Select Committee of the House of Lords, presided over by Lord Kintore. It was opposed by the Rhymney and Aber Valleys Gas and Water Company. Mr. Ram, K.C., in opening the case, explained that the Order gave the District Council authority to purchase electricity from the South Wales Electric Power Distribution Company, and supply Caerphilly. The Gas Company were the only opponents. The area of the Council was 14,000 acres, and was largely being developed. The population were chiefly colliers. The Council proposed to supply the larger centres of population—Caerphilly, Llanbradach, Senghenydd, and Aber. They had entered into an agreement with the Company to take electricity, on condition that their Lordships passed the Bill, as the other House had done. The Gas Company asked that a clause should be inserted by which the price of current should be raised after periodical examination every three or five years, if the expenditure on the undertaking was not being met. This would prevent any cost of the works from falling on the rates. The Council objected to the insertion of this clause, on the ground that it would permit the Gas Company to crush the electrical undertaking out of existence by underselling. Public meetings held locally had been unanimous in support of the proposal. Mr. Corbett, the Surveyor to the Bute Estate, said the district was extremely badly lighted. The population was 19,000, and of these only about 5000 were supplied with gas. He held the view that the clause proposed to be inserted in the Order would be used as a weapon to crush out the electrical undertaking, and would not be a benefit to the ratepayers. In answer to the Chairman, witness said he was instructed to support the scheme on behalf of Lord Bute. Mr. W. Thomas, a member of the Caerphilly Urban District Council, and Mr. A. H. Preece, the Electrical Engineer for the scheme, also gave evidence. The latter said the capital cost would be £5500. If there was any loss and consequent burden on the rates, it would be infinitesimal. Cross-examined by Mr. Shaw, for the Gas Company, witness said that he expected the undertaking would be a success in two years. He agreed that the district was not a model one for electric supply. Mr. Shaw, addressing the Committee, characterized the majority of the houses in the district as "oil and candle houses," who did not even burn gas, and would much less take a supply of electricity. He did not call any witnesses. The Committee, after a minute's deliberation, permitted the Bill to proceed.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Thursday, Aug. 4.

(*Before the* MASTER OF THE ROLLS *and Lords Justices* STIRLING *and* MATHEW.)

Benning v. Ilford Gas Company.

This was an appeal by the defendants in an action brought to recover damages for injury done to property by last year's floods. At the trial before Mr. Justice Grantham,* the Jury found for the plaintiff.

Mr. LAWSON WALTON, K.C., Mr. H. E. DUKE, K.C., and Mr. MEYER appeared for the appellants; Mr. SHEARMAN, K.C., and Mr. J. R. CRAWFORD represented the respondent.

Mr. LAWSON WALTON said he moved on behalf of the defendants in the Court below to set aside the verdict of the Jury on the ground of misdirection, and as being against the weight of evidence; also (and this was the main ground of the appeal) that judgment ought to be entered for the defendants, because there was no evidence to be submitted to the Jury in support of liability. The action was of a two-fold character. Plaintiff complained that his land had been flooded, and that the defendants were responsible for the flooding, having negligently exercised their statutory power; secondly, that they had created a nuisance; and, thirdly, that they were guilty, as landowners, of lack of ordinary care in the treatment of their own property. The defendants occupied premises on the western bank of the River Roding—a small sluggish stream passing through the Essex Marshes, and entering the Thames about West Ham; and the plaintiff was the owner and occupier of certain small property built on the marshes at a level considerably lower than the river itself. The country was protected by banks, the height of which was regulated by Commissioners; and the main question for decision was whether plaintiff had not suffered in the common misfortune which overtook many persons by reason of the exceptional floods of last year. The rainfall on three days of June, 1903, was equal to half that of the whole year; and the effect of the fall was considerably increased by the fact that the wet winter and spring had saturated the ground up to the extreme point of its absorbing capacity, with the result that the whole place was flooded. The present action was a test one, by which it was sought to cast upon the defendants the responsibility for the flooding. They originally occupied land on the banks of the river; and in 1899 they obtained power to enlarge their works by acquiring a strip of adjoining property. The Act contained a proviso that if in the course of three years the Company should fill up the Aldersbrook, they should make a culvert, so as to allow the water to escape; but that after the lapse of three years they were at liberty to fill up the brook entirely. After the Act was passed in 1901, the defendants erected on the opposite side of the brook a gasholder; and in order to connect it with the manufacturing plant, the bank, which was more than 17½ feet high, was cut through, and a bridge was constructed so that the workmen might pass to and fro. From September, 1901, till June, 1903, things remained without complaint; and at the end of the three years, the defendants proceeded to close up the brook—the stream being diverted into the river. In June, occurred the great rainfall; the bridge was partly choked, and the water found its way down the channel of the brook, and through the wall which defendants had constructed. The result of the flood was somewhat serious—many houses being inundated; and the damage to the plaintiff had been assessed by the Official Referee at £100. He (Counsel) denied that the injury was caused by the negligence of the defendants, and pointed to the finding of the Jury—that their operations had not weakened the embankment. On this finding, he contended that judgment ought to have been entered for the Gas Company. The flood was of so extraordinary a nature that ordinary precautions could not have prevented the mischief—in fact, it might be described as the act of God. As they had raised the embankment a foot higher than the height prescribed by the Commissioners, the Company could not, by any possibility, be said to be guilty of negligence. Having called attention to the evidence given at the trial, and to the summing up, which Counsel said did not properly place the case before the Jury, he asked that judgment should be entered for the appellants.

Mr. DUKE followed on the same side, and cited several authorities with the view of showing that, on the finding of the Jury, the verdict ought to have been in favour of the Company.

Without calling on the respondent's Counsel, their Lordships proceeded to deliver judgment.

The MASTER OF THE ROLLS, after stating the facts of the case, said it had been argued on behalf of the appellants that there was no evidence of negligence on their part, and, further, that no adequate direction had been given by the Judge as to what constituted an act of God, and that therefore they were entitled to judgment or a new trial. He thought there was abundant evidence of negligence on the part of the Company. It could not be contended that an Act of Parliament absolved a company, in carrying out works, from the obligation to take all reasonable care in order to minimize damage to other people. Putting a dam across a running stream, was, in the opinion of the Jury, not a reasonable way of stopping the brook; and they also found that the damage was caused by the Company creating a nuisance. In his opinion, there was plenty of evidence to warrant them in coming to such a conclusion. He also thought the direction by the Judge upon the point of whether or not the damage was the result of an act of God was sufficiently explicit. What was in question was not an act of God, but of man—viz., the ponding up of water behind a barrier which really organized the catastrophe that occurred. Had the Jury found that this was an act of God, he thought the finding would have been against the weight of evidence.

Lord Justice STIRLING was of the same opinion. The defendant

* See "JOURNAL," Vol. LXXXVI., p. 247.

Company, for their own convenience, blocked up the brook by erecting a dam across the centre; and the Jury found that they had not acted reasonably in so doing. There was plenty of evidence to support this finding. There being no misdirection by the Judge, the appeal failed.

Lord Justice MATHEW concurred.

The appeal was therefore dismissed, with costs.

On the application of Mr. LAWSON WALTON, a stay of execution was granted for a month, so that defendants might make up their mind whether or not they would appeal to the House of Lords.

SUSSEX SUMMER ASSIZES, LEWES.

(*Before Mr. Justice* DARLING *and a Special Jury.*)

Packham v. Burgess Hill Water Company.

The hearing of this action, in which Mr. Charles Packham, the owner and occupier of a mill known as Cobb's Mill, situated on Sayers Common, preceeded against the Burgess Hill Water Company for an alleged interference with the flow of water to the mill, occupied his Lordship, at Lewes, from the 25th to the 27th ult.

Mr. W. P. G. BOXALL, K.C., and Mr. E. E. HUMPHRYS appeared for the plaintiff; Mr. H. F. DICKENS, K.C., and Mr. E. POLLOCK represented the Company.

Mr. BOXALL said the working of the plaintiff's mill depended upon water which flowed from the direction of the downs, and went past the mill into the Adur, and eventually found its way into the sea at Shoreham. The principal supply for the mill came from the chalk downs, which constituted in themselves an enormous reservoir. The water did not pass away from the saturated chalk at first, but after an interval of perhaps two or three months; and this was the time when the water was of the greatest value to the mill. In 1868, the plaintiff put steam power into the mill; but, of course, every hour of water power he could get for it was a saving. Each day he worked with steam cost him about 36s. For some years he had noticed a constant shortage of water; and he attributed it at first to the seasons. His engine ultimately broke down, and he had to rely upon water power; but he found the supply fell short of what it was before. He made inquiries last year, and found the whole state of things had changed. Instead of a small patch of willows through which two streams flowed, he found a reservoir, occupying nearly two acres of ground, with an embankment 18 feet high. The water had to be 16 feet deep before a drop could escape, and the reservoir was estimated to hold 4 million gallons of water. The embankment was 50 feet wide, and what water did escape was impounded in a storage pond about one-third of an acre in size, and holding 380,000 gallons. It was found on examination that there was really not any water worth talking about coming out of this place. The estimated flow was not more than 60,000 gallons a day; while the unobstructed flow was estimated at 600,000 gallons, or a total of 219 million gallons a year, which, translated into horse-power, would supply the mill with all the necessary power for 69 days at 12 hours per day—meaning a saving to plaintiff of 36s. a day, or £124 a year. Plaintiff consulted his Solicitor, and at first it was said the Company would strenuously resist any proceedings if he decided to take action against them. Later, their Solicitor (Mr. Stevens) wrote making an unconditional offer to reduce the height of the overflow by 3 ft. 6 in. Counsel went on to refer to the site of the reservoir, and alluded to a pond originally on it which it was the intention of Mr. Campion, from whom the ground had been leased, to use as a fish pond. This had been abolished; and for 37 years willows and stuff had been allowed to grow there. Counsel also pointed out that a well had been sunk near one of the two springs; and he contended that the Company wished to increase their supply, and had obtained 15 million gallons a year extra since.

Plaintiff was called, and bore out Counsel's statement.

In cross-examination by Mr. DICKENS, witness said he had noticed that the supply of water was short; but he had nothing to go by.

Mr. *James Johnston*, the Water Engineer to the Brighton Corporation, said he had seen the reservoir referred to every few months from 1897, and on Jan. 29, 1899, he found it empty. There were evidences of the embankment to the north being considerably raised, and some brickwork round a penstock was not completed. The springs of water were well marked, and streams were running along the bottom of the reservoir to the penstock outlet. He made a test as to the quantity of water passing through the penstock, and came to the conclusion that it was 500,000 gallons a day. The springs were not then at their highest. In March, they were just double; and from measurements of other streams he estimated the yield of the spring, at its maximum, at about a million gallons a day. Variation between the maximum and the minimum was between one-fourth and one-fifth. Asked to state the highest point at which chalk held water in saturation, witness said something above 240 feet from Ordnance datum sloping down to the level of the sea. In reply to a further question, he said the reservoir being where it was would have the effect of driving a great quantity of water back to the sea, instead of feeding the springs.

Cross-examined by Mr. DICKENS, witness said the Company had raised the line of saturation between the dam and the apex to the south, and, as a consequence, had forced water south, east, or west—thus diverting it from the stream.

Several old residents having been called to speak as to the quantity of water that used to be in the stream,

Mr. *Herbert Ashley*, the Resident Engineer to the Portsmouth Water Company, was called. He generally corroborated Mr. Johnston's evidence as to the loss of water from the springs in consequence of he construction of the reservoir. Describing the effects of the dam, he said the apex in the line of saturation would probably be raised, thus causing a large quantity of water to flow south, and to be a loss to the stream. Asked whether, if a pond 9 ft. 6 in. deep had a 2 ft. 6 in. water level added, it would make any difference to the stream, witness said it would.

This closed the case for the plaintiff.

Mr. DICKENS then addressed the Jury for the defendants, and endeavoured to show that the plaintiff's grievance was imaginary, that the condition of the stream had been much exaggerated, and must be largely accounted for by the number of dry summers. Possibly it had been affected by the defendants doing what they had a perfect right to do—getting into the well the underground water, and not the water from the pond. Mr. Campion, from whom the ground had been leased, was entitled to a right to have this pond; and his right was one which remained with the Company, because they took the property from him with the rights attaching thereto. If the right remained with Mr. Campion in 1894, when the Company filled in the bay with water, they were acting in accordance with the rights that devolved upon them. The question of non-user, even for a considerable length of time, was not by any means conclusive that the easement was abandoned. It was for those who suggested the abandonment of the user to satisfy the Jury that there was an intention that the person should give up the user with the intention of abandoning it. He contended that the Company had availed themselves of a right which was only postponed and never abandoned.

Mr. *Baldwin Latham*, examined by Mr. POLLOCK, said he had made a practical survey of the whole of the South Downs, from Arundel to Eastbourne. Asked if he agreed, in regard to the question of the apex, that the water was held in the downs at a certain altitude by natural causes, he said it depended upon the rainfall. The dip of the strata was to the south, and the water generally fell that way. He agreed that water was maintained in the chalk up to a certain line of saturation. As to the point, the high-water mark on the 10th of June last was at 269 feet. Farther south, it was higher.

Mr. POLLOCK: Is it possible, by the alteration of this line of saturation, as suggested by Mr. Johnston, that the water should have been driven back in a southern, eastern, or western direction?

Witness said it was impossible. It was also impossible for the water which had once got into the reservoir to be taken out by the defendants' pump at the pumping-station. There were a number of other water-flows to Cobb's Mill. If the contents, suggested at 5 million gallons, were sent down stream for 300 working days in the year, it would represent 0·03-horse power, or be of the worth of £19.

Does this alteration of the inclination of the line of saturation affect the water that flows past the mill?—In my judgment it gives more water. The Company do not get any benefit by the storage.

Colonel *W. H. Campion*, J.P., spoke of his early knowledge of the pond; stating that he fancied he fished in it for trout after his return from the Crimea, and that he recollected it being silted up, the penstock drawn up, and the water let out. He thought of filling the pond some day; but he put it off because it would mean the outlay of £200 or more.

Joseph Dyson, the Company's inspector, expressed the opinion that the quantity of water which flowed in the summer since the pond was raised to its present level was more than before. Before the Company's work was carried out, he had known the stream to be dry in the summer.

George Bignell, a ganger in the employ of the Company for 25 years from time to time, spoke to assisting the last witness in constructing a penstock in 1894.

Mr. *S. H. Norman*, the Company's Secretary since 1890, said the Directors instructed him to consider the question of raising the bay at the north end of the pond; and the new brick construction was built at his suggestion. This was practically 3 feet above the old penstock, and the overflow was this amount higher than under the old one constructed by Dyson.

Mr. *W. Wood*, a retired miller, and Chairman of the defendant Company, spoke of his early connection with New Close Mill (which was the first mill below the one in question) and also with Ruckford Mill. He said the source of the water supply to Ruckford Mill was precisely the same as at plaintiff's mill. There were several other springs in addition to Whiteland's. Occasionally a lot of water came from Clayton. He had machinery in New Close and Ruckford Mills mainly in consequence of the constant decrease in water. Since the bay was raised to its present height, he believed more water had gone down the stream.

Mr. *W. Wood*, jun., a miller and corn merchant, and one of the Directors of the Company, said he took Ruckford Mill about 1877, and was still working it. As to the source of water supply, he did not attribute any particular part of it to any one stream. The mill stream never dried. He alluded to a conversation he had with the plaintiff, during which he alleged Packham told him he attached no importance to the water supply—it was more a nuisance than anything else; and he knocked a few cogs out of his wheel to let the water run away.

In cross-examination, witness said he had not used any steam power this year or last, as there had been enough water to carry on his work.

Other witnesses having given evidence as to the supply of water, the case for the defence closed.

Plaintiff was recalled to explain a statement made by Mr. Wood, jun., in regard to a quagmire which was alleged to have been caused in Mr. Wood's meadow through the water getting on it. He said he acted on a suggestion by Mr. Wood, and he (Mr. Wood) put up a wall which he (plaintiff) paid for. In regard to the conversation referred to, he meant the bay was a nuisance, and not the water.

Mr. DICKENS, addressing the Jury, emphasized the important point as to whether the rights of Colonel Campion were ever abandoned. Recounting what work had been carried out by the Company, he said the one great necessity of life would never be supplied to the public unless it was undertaken by bodies of this description. He closed an exhaustive address by saying that if the Jury returned a verdict in favour of the plaintiff, he ventured to predict that in a few months he would not thank them.

Mr. BOXALL also addressed the Jury, saying that the principal points they had to decide were: (1) Was there an easement? If so, what was the nature of it? (2) Was there any abandonment?

Justice DARLING, in summing up, said the case raised important issues, and he asked the Jury to approach the matter absolutely free from any prejudice against either of the parties. He reminded them that what they had to discover was whether there was an easement or

right to have the pond. Colonel Campion only abandoned his right if they found he had the intention of abandoning it. Illustrating the consequences if the plaintiff obtained a verdict, his Lordship asked who would be the better for it if the bank were taken away and the water allowed to go. The stream would be fuller for a time, and would then flow as it did a thousand years ago. The defendants would be the worse off, and so would all the people they supplied with water. No doubt some people would find malicious pleasure in that. But how about the farmers down the stream? He reviewed the evidence given showing that more water had flowed of late, and suggested that they would have little cause to remember with gratitude the names of the Jury and himself in their combined action in bringing about the destruction of the bank. He reminded the Jury that the Legislature had conferred upon the defendants, for the public advantage, the right to pump water and supply it. If they chose, in a place where they might do it, to sink a well and pump every drop of water out of the ground, so that none went to the stream, they might do it. If the Jury gave a verdict which resulted in the absolute abolition of the pond, it would be open to the defendants to say: "Well, our pond is gone, and our system of damming up the water is at an end. What must we do? We will deepen our well and drive our adit here and there." If the result were that they prevented water going down to Mr. Packham's mill, he would have no remedy whatever. His Lordship concluded by leaving the following questions to the Jury: (1) Had Colonel Campion an easement or right to dam up the water, and thus to have a pond at Whitelands before 1857? (2) Did he abandon his right to dam up the water in the pond? (3) What depth of water had he, as a right, in the pond from the true bottom to the overflow? (4) What was the depth of the water in the pond from the true bottom to the overflow when the defendants completed their works in 1894? (5) Did the defendants, by the reconstruction of the pond, diminish plaintiff's supply of water to the mill? (6) What damages should be awarded?

The Jury retired to consider their verdict. On returning into Court, they handed to his Lordship the following answers to the questions left to them: (1) Yes. (2) No. (3 and 4) 9 ft. 6 in. (5) Yes. (6) £350

Mr. DICKENS asked what £350 meant.

The FOREMAN said it was in respect of what the Company had done since they commenced to raise the dam after they had finished their work in 1894.

Mr. DICKENS: Do they mean from that that the excess is 3 ft. 6 in.?

Justice DARLING: Clearly. It is very much the verdict I should have given.

Mr. BOXALL asked his Lordship if he would grant an injunction.

Justice DARLING said he would deal with that matter in London.

In the King's Bench Division of the High Court of Justice on Saturday, his Lordship had the action again before him for further consideration. Mr. Boxall, K.C., asked that judgment might be entered for the plaintiff for £350, and for an order for payment out of Court of £50 paid in by the defendants. He also asked for an injunction restraining the defendants from increasing the burden which existed in 1857 by the easement that Mr. Campion and his predecessors had acquired to have the pond, and further, from raising the level of the water above 9 ft. 6 in. Mr. Dickens, K.C., submitted that no injunction ought to be granted, as the defendants had always been willing to restore the pond to its old level by reducing the height of the penstock 3 ft. 6 in. His Lordship said judgment would be entered in favour of the plaintiff for £350. The Jury had found that the defendants were entitled to have a dam at a place where the plaintiff denied that they had the right to have one, and that they were entitled to a depth of water of 9 ft. 6 in. from the true bottom of the pond. It was perfectly plain, from what passed after the finding had been given, that the Jury thought the defendants were right in what they had done up to 1894, but that what they did after January in that year was not justified. The defendants must reduce the height of the penstock by 3 ft. 6 in., so as to make the height of the water what it was in 1894. He did not think it necessary to grant any injunction. The plaintiff would receive the general costs of the action; and the defendants would have the costs of the issues on which they had succeeded.

Unguarded Gas-Stoves in Shops.

In the King's Bench Division of the High Court of Justice, before Mr. Justice Bray and a Common Jury, a case was heard a few days ago in which Mrs. Edith Henderson claimed damages from Messrs. Fuller, Limited, who carry on the business of confectioners, for injuries sustained, and expense incurred, by reason of their alleged negligence in placing and keeping a gas-stove in a dangerous position and condition in their shop at No. 31, High Street, Kensington, in consequence of which the plaintiff's clothing was set on fire. In particular, plaintiff alleged that defendants were negligent in placing the stove so that it was dangerous to customers in the shop, and that they were further negligent in failing to put a proper guard round the stove, and in failing to warn the plaintiff that the stove was dangerous. The defendants denied the negligence alleged, and contended that the plaintiff was guilty of contributory negligence, inasmuch as she, while wearing an inflammable boa, carelessly walked too close to the stove, which she knew, or ought to have known, was in the shop. The plaintiff, who was a professional singer, admitted, in cross-examination, that she had been in the defendants' tea-room a dozen times before the day of the accident, but had never seen the stove alight till then. The Manageress and other witnesses stated that the stove in question had been in the shop for eight years without causing any accident or complaint. At the time of the accident, there was no defect in the stove which could cause it. A representative of the firm who manufactured the stove stated that his firm had during the last ten years sold thousands of stoves of the same pattern without having received any complaint of an accident. The Jury returned a verdict for the plaintiff for £25, and judgment was entered accordingly.

Charges of the Bury and District Water Board.

An important action to settle the legal method of levying the water-rate under the compounding system of rating in the area of the Bury and District Joint Water Board was commenced in the Police Court at Radcliffe last Wednesday. Where the rates have been paid with the rent, the Board have based their charge for water on the total payment to the landlord. The Radcliffe Property Owners' Association, supported by property owners in Haslingden, Little Lever, and Rawtenstall, instituted a test case, on the ground that the amount of the rates paid with the rent should be deducted before arriving at the basis for the water charge. The legal issue depends upon the definition of the term "rack rent." The Water Board contend that it includes everything paid as rent, and that if the present system were altered the Board's loss would be increased from £4000 to £16,000. The property owners maintain that "rack rent" means the true "rentable" worth of the house. Where there was compounding, every time the rates were increased the water charge was also increased. The Bench held that they had no jurisdiction to decide the case; but if the Superior Court held otherwise, then they were in favour of the Water Board's contention. Notice of appeal was given.

Fraudulent Consumption of Gas.

At the Hull Police Court, last Thursday, a hairdresser named William Fletcher, of 232, Holderness Road, was summoned for unlawfully consuming the gas of the Sutton, Southcoates, and Drypool Gas Company. Mr. Birks, who prosecuted on behalf of the Company, explained that the defendant owed more than £3, and, as he did not pay, the gas was cut off on the 8th of July. The next night an incandescent light was seen burning in the shop, and also on the 15th and 20th. It was then discovered that the defendant had again connected the gas without the Company's knowledge. There were three summonses against him. For the defence, Mr. J. H. Payne said Fletcher was about to file his petition. He had a wife and family, and he could not possibly have carried on his business without a light. He had written a letter to the prosecutors in which he promised to pay for all the gas he had used in this way. The Magistrate remarked that the penalty for such an offence was £21; but he said he would only fine the defendant £1 10s. for each day, the total being £4 10s., and costs, or 30 days' imprisonment in default. He would allow time for the amount to be paid.

Theft from a Prepayment Meter.

At Swansea, a few days ago, William John Knight, a painter, was charged with stealing about 10s. in coppers from a gas-meter, belonging to the Swansea Gas Company, in a house on the Parade, Mumbles. The meter, which had been broken, was produced in Court. Mr. P. Lloyd, who carries on business at the house, said he gave the accused a job on the 26th ult.; and Emma Lloyd, his daughter, deposed that she saw Knight in the shop about three o'clock in the afternoon on that day. She went out to the back of the shop, and when she returned she found something wrong with the meter; the box containing the money being missing. Knight had then left the premises; but she did not see him take anything. A constable stationed at the Mumbles said he arrested the accused late in the evening, and charged him with the theft. Knight said there was no evidence against him. Witness found a large file and a pair of pincers alongside the gas-meter. Samuel Davies, foreman at the gas-works, and also a collector, gave evidence. Defendant pleaded guilty, and was sentenced to three months' imprisonment, with hard labour.

Gas Profits and the Embezzlement at Longton.—At the last meeting of the Longton Town Council, the minutes presented by the Gas and Electricity Committee showed a surplus profit from the Gas Department (after paying £2000 to the Corporation in relief of rates) of £3128. It was recommended that the profits should be appropriated as follows: That the defalcations of Speakman (the Secretary and Cashier) to March 31, amounting to £2970, be written off, and that the remaining balance of £158 be placed to the credit of the electricity account. The minutes were passed without discussion.

Coal Contracts at Rochdale.—At a recent meeting of the Gas and Electricity Committee of the Rochdale Corporation, the contracts for the supply of coal to the gas-works for the ensuing year were considered, and tenders for the delivery of 52,000 tons were given out to nine firms. There were in all forty tenders. The quantity of coal consumed annually is about 55,000 tons, and the contracts for the 3000 tons still required are expected to be decided upon at the next meeting. The prices at which the Committee are obtaining coal this year show a further reduction, averaging 5d. per ton, which means a saving of more than £1000 on the twelve months' contracts.

Reinstatement of Trenches in the Metropolis.—The Lambeth Borough Council have had prepared a return showing the average charges made to gas companies, &c., by the Metropolitan Local Authorities for the reinstatement of trenches to be as follows: York stone relaid per yard superficial, 1s. 8·64d.; new York stone, 10s. 0·82d.; new Victoria stone, 8s. 10·71d.; tar paving relaid, 4s. 0·76d.; asphalte footway, 8s. 6·31d.; asphalte carriageway, 14s. 3d.; kerb refixed, per foot lineal, 2·61d.; kerb refixed on concrete, 7d.; new kerb on concrete, 2s. 7·52d.; pitched carriageway relaid per yard superficial, 2s. 4·88d.; pitched carriageway relaid on concrete, 4s. 10·66d.; new pitched carriageway, 15s. 10·83d.; macadam, 2s. 2·30d.; ballast or flints, 1s. 6·35d.; concrete per yard cube, 17s. 2·25d.; wood relaid per yard superficial, 15s. 11·4d.; brick paving relaid, 3s. 5·75d.; boxes repaved, 3s. 7·50d.; new paving bricks, per 100 bricks, 13s. 8d.; new boxes, each, 9s. 9d.; holes cut, 1s. 7·75d.

MISCELLANEOUS NEWS.

MANCHESTER GAS SUPPLY.

Accounts of the Corporation Gas Department for the Past Year.

In the "JOURNAL" for the 12th ult., we gave some statistics of the working of the gas undertaking of the Manchester Corporation in the year ending the 31st of March last. We have now received from the Superintendent (Mr. Charles Nickson) the report and accounts of the Gas Department for that period. The figures in the former, having already been given, the following additional particulars are taken from the accounts.

REVENUE ACCOUNT.

INCOME.

Gas-rental—			
Ordinary meters		£508,171 11	4
Prepayment meters		52,792 12	5
Public lamps		50,378 6	11
Stove-hire (abolished June 24, 1903)		1,777 10	4
Residual products—			
Coke	£72,887 7 5		
Tar	27,191 0 10		
Sulphate of ammonia	23,853 19 11		
Carbon	305 12 3		
		130,238 0	5
Rents of cottages, &c.		605 2	4
		£743,963 3	9

EXPENDITURE.

Cannel, coal, and carburine (including cost of unloading, &c.)		£221,147 17	7
Carbonization (retort men's wages, &c.)		40,461 8	11
Purifying material and wages		3,309 16	4
Retorts, fire-bricks, &c. (including cost of setting)		10,739 15	11
Repairs and maintenance of works, mains, &c.		70,850 6	5
Renewals of plant, &c.		51,050 2	2
Carburetted water gas		58,730 12	0
Salaries and wages of clerks in Superintendent's office, rental and inquiry offices, and meter inspectors		33,909 1	5
Collectors', receivers', and cashiers' salaries		9,129 19	6
Rents, rates, and taxes		52,511 4	7
Compensation under Workmen's Compensation Act, 1897		620 0	6
Bad debts written off		1,009 8	6
Miscellaneous expenses		6,808 8	4
		£560,278 2	2
Balance carried to the profit and loss account		183,685 1	7
		£743,963 3	9

PROFIT AND LOSS ACCOUNT.

Interest		£41,418 1	0
Sinking funds		48,425 18	4
Balance (net profit on the year's working)		93,841 2	3
		£183,685 1	7

The balance of net profit is disposed of as follows :—

Amount paid over to the city fund account		£70,000 0	0
Applied in extension of works where borrowing powers are not granted—			
Carburetted water-gas plant		1,603 0	3
Chemical works		85 18	4
Placed to contingent fund account		22,152 3	8
		£93,841 2	3

The accounts are followed by the usual appendices, furnishing particulars in regard to the progress of the undertaking.

Appendix A is a comparative statement of the gas transmitted from the works in the daytime and during the twenty-four hours, for the past two years. Summarized, the figures are as follows :—

	Daytime. Cubic Feet.	Twenty-four Hours. Cubic Feet.
Year ended March 31, 1904	1,520,618,000	4,994,236,000
Do. Do. 1903	1,402,383,000	4,837,001,000
Increase	118,235,000	157,235,000

	Cubic Feet.
Gas transmitted from the works	4,994,236,000
Do. accounted for	4,808,795,000
Loss (by condensation and leakage)	185,441,000 or 3·71 per cent.

In Appendix B, particulars are given as to the results of the working from March 31, 1885, to March 31, 1904. The table contains statistics as to the number of tons of coal and cannel carbonized, the total make of gas, the percentage unaccounted for, the yield per ton of coal, the illuminating power of the gas, the quantity of residual products, &c., each year in the above-mentioned period. The particulars for the past financial year are as follows: Coal and cannel carbonized, 458,864 tons; gas made, 4,986,917,000 cubic feet; yield per ton of coal carbonized, 10,868 cubic feet; illuminating power, 17·80 candles; make reduced to 20-candle power, 4,438,356,000 cubic feet; make per ton, 20-candle power, 9672 cubic feet; percentage of output unaccounted for, 3·71; coke for sale, 168,085 tons; do. per ton of coal, 9·52 cwt.; make of tar, 24,543 tons; do. per ton of coal, 11·86 gallons; ammoniacal liquor (10-oz. strength) made, 10,002,902 gallons; do. per ton of coal, 28·33 gallons; sulphate made, 3589 tons; do. per ton of coal, 24·09 lbs.

Appendix C shows the number of stoves and of each size of meter in use during the year in the city and out-townships. At the close of the past financial year, there were 11,399 stoves on hire within, and 6323 beyond, the city—together, 17,722, compared with 8100 and 4703 (together, 12,803) at the corresponding date in 1903; so that there was an increase of 4919. The number of meters in use was 146,457 in 1904 and 141,954 in 1903. There was last year a net increase of 4503 on the number for the preceding year. The number of prepayment meters in use on March 31 last was 44,341—an increase of 2476 on the number at the close of the preceding year.

From Appendix D, we learn that the gas-mains laid last year within the city extended to 21,076 yards, and beyond the city to 6928 yards—a total of 28,004 yards, or 15⅞ miles 284 yards. The mains taken up were 6880 and 375 yards respectively—a total of 7255 yards, or 4 miles 215 yards. The total net increase during the year, therefore, was 20,749 yards, or 11¾ miles 69 yards. The total length of mains laid up to March was 1,483,955 yards, or 843 miles 275 yards.

Appendix E is an abstract of the capital, revenue, and profit and loss accounts. It shows (*inter alia*) the amount of gross profit made from the gas undertaking, and the mode of its appropriation, also the amount of borrowed money owing, excess of assets, &c., from March 31, 1884, to March 31 last. The figures for the past financial year are as follows: Profit, £183,685; paid over for improvement purposes, £70,000; applied in extension of works, £1688; borrowed money owing, £1,211,563; and excess of assets, £1,429,697. The profit of £183,685 is appropriated thus: Interest, £42,764 (including amount charged to sulphate of ammonia); liquidation of mortgage debt, £49,624 (do.)—net profit, £93,841. From June 24, 1843, the date when the works were taken over by the Corporation from the Commissioners of Police, the gross profits on the gas undertaking have amounted to £5,292,000, out of which £1,230,564 has been paid for interest, and £1,195,833 placed to the sinking fund; leaving the net profit £2,870,486. Of this total, £2,300,100 has been handed over to the Improvement Committee and added to the city fund, £329,201 has been paid for street lighting (making £2,629,301 used in relief of the rates), and £96,292 applied in the extension of works for which no borrowing powers have been granted. The bulk of the last item (£83,670) has been expended on the installation of carburetted water-gas plant, and £9052 has been employed in the establishment of chemical works.

SALFORD CORPORATION GAS SUPPLY.

The Past Year's Working.

The report of the Gas Committee of the Salford Corporation, with the accounts of the Gas Department, for the year ending the 31st of March, has lately been issued. The Committee express their pleasure in reporting that, notwithstanding the mild weather during the past winter, the sales of gas increased to the extent of 2·68 per cent. for the financial year. There was also a considerable increase in the number of consumers during this period. The coal and cannel carbonized amounted to 155,715 tons; and the quantity of gas made was 1,585,269,000 cubic feet, of an average illuminating power equal to 19·63 candles—the parliamentary standard being 18 candles within the borough, and 17 candles as tested in the out-districts. The cost of coal was less than in the previous year. The market for residuals showed improved results for coke and sulphate of ammonia; but the receipts from the sale of tar were less. The works and plant (under the supervision of Mr. W. W. Woodward, the Engineer and Manager) were maintained in a thoroughly efficient condition; and contracts were let for a complete installation of stoking machinery and coke-handling plant for the Liverpool Street retort-house. The business in prepayment meters continues satisfactory. On the 1st of July last year the price of gas was reduced by 2d. per 1000 cubic feet to all ordinary consumers, and by 3d. to consumers of 250,000 cubic feet and upwards per quarter. The more favourable terms obtained in purchasing coal for the current year enabled the Committee to recommend a further reduction of 1d. per 1000 cubic feet to all consumers by ordinary meter, and a reduction equivalent to 6⅜d. per 1000 cubic feet to consumers using prepayment meters.

The year's accounts show that the sale of gas produced £175,792; the rental of stoves, £2138; residual products, £60,816; and rents, £479—making a total of £239,225. The expenditure on the manufacture of gas came to £127,782; on distribution, to £12,705; and on management, to £5963—the total outlay being (with £785 written off as bad debts) £163,615. The balance carried to the profit and loss account is £75,610. After paying the interest and annuities, and setting aside £15,873 in redemption of loans, and writing off £13,000 for depreciation, there is left a balance of £27,540 as net profit for the year.

Welsh Water in Birmingham.—The water turned on by His Majesty the King at Rhayader on the 21st ult. arrived in Birmingham early on the morning of the 28th, and the event was signalized by the hoisting of the Union Jack. The next day the Welsh water was flowing into the Frankley reservoirs at the rate of 8 million gallons per 24 hours. There are two of these, each capable of holding 100 million gallons. The water will be allowed to flow into both reservoirs until a depth of 30 feet has been attained, and then the city will have a reserve of 200 million gallons.

Contractors and Guarantees.—The Urban District Council of Ballinasloe are contemplating improvements in their gas-works plant; and at their last meeting they had under consideration the placing of a contract with Mr. Steele, a local manufacturer, for the supply of new retorts. A condition was sought to be imposed that he should give security for the performance of the contract, and also that he should guarantee the work for twelve months. While willing to execute a bond for satisfactory performance, he declined to give a guarantee; pointing out that the work was of a special class, and that if inexperienced men were put in charge of the retorts they might be melted away in 48 hours. The Council resolved to accept Mr. Steele's terms; the work to be done under the supervision of the Gas Manager.

THE GASLIGHT AND COKE COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held last Friday, at the Offices, Horseferry Road, Westminster—Colonel Sir W. T. MAKINS, Bart. (the Governor), in the chair.

The SECRETARY (Mr. H. Rayner) read the notice convening the meeting; and the report and accounts (*ante*, p. 340) were taken as read.

The GOVERNOR: Ladies and gentlemen, the half year under review is, as you will have noticed, a most satisfactory one, and in at least some of its features is remarkable. So low a price for coal in combination with such high prices for residuals is not a common experience. It is one which has not occurred for a long time in this Company; and it may not soon occur again. Let us hope, however, for the sake of the shareholders and the consumers alike, that the combination to which I refer will occur more frequently in the future than it has done in the past. Another favourable feature is the increase in the sales of gas. After a period of stagnation in our output, the business of the Company is once more advancing.

CAPITAL EXPENDITURE.

Coming to the capital account, this shows an expenditure of £63,915—I leave out shillings and pence—against which there is a credit of £19,886; making a net capital expenditure of £44,029. New and additional mains and service-pipes cost £17,281; meters, £30,091; and stoves, £16,542. For the second half year in succession, there has been practically no capital expenditure on works. All the money which has been spent is in connection with the increase in the number of the Company's consumers.

THE REVENUE ACCOUNT.

Turning, now, to the revenue account, probably the most satisfactory feature of the half year is the increase of 3·45 per cent. in the sales of gas. To this is due an increase in the gas-rental of £32,247. Stove-rental also shows an increase of £2919. The increase, therefore, from these two sources amounts to £35,166. These increases are not, however, the only satisfactory feature of the revenue account. Residuals, except in a few cases, realized better prices than in the corresponding half of 1903. The income from coke and breeze increased by £22,558; and from ammoniacal liquor and sulphate, by £14,384. So that, though tar and its products brought in £5294 less, the result for the half year was an increase of £31,648 in the receipts for residuals. On the debit side of the account, coal and oil cost £22,830 less, notwithstanding the additional quantity used. So that, taking credit for the receipts from residuals, the net cost of coal was £54,478 less than in the corresponding half year. This is a most satisfactory result; and, as I have already pointed out, it is a somewhat rare occurrence to find both coal and oil cheap and at the same time residual products fetching high prices. There are some other items in the account which call for notice. There is an increase of £6030 for purification, partly due to the greater make of gas, and partly to circumstances which it is believed may not occur again. Distribution charges show a large increase; but this is chiefly due to the extension of the Company's business—an increase of 16,084 automatic meter consumers, of 16,431 in stoves sold and let on hire to ordinary and automatic meter consumers, and a satisfactory increase in the number of gas-engines at work in the Company's district.

GAS-ENGINES AND INCANDESCENT LIGHTING.

I may remark, in passing, that the Directors, being anxious to popularize the use of gas-engines, have arranged to let them out on the hire-purchase system, and to grant, under certain conditions, a special discount for gas used for motive-power purposes. The principle adopted by the Company of supplying mantles and maintaining the consumers' incandescent burners has been very successful; and is apparently much appreciated by the public. The number of burners maintained increased by 16,120—that is. from 71,237 to 87,357—during the half year. The Company undertake this work for 9d. per quarter per burner; and the system is proving most useful in the struggle with our competitor the electric light.

PUBLIC LIGHTING.

While dealing with the distribution of gas, I should like to refer briefly to the public lighting, as there has been a good deal of interest manifested in regard to this subject during the last six months. The public lamps in the Company's district, after showing a decrease for four years, have begun in the last twelve months again to increase. This is, I think everyone will admit, extremely satisfactory, and is largely due to the introduction of ordinary incandescent and high-pressure lighting—the former enabling gas easily and successfully to compete with electric incandescent lamps both as to light and cost, and the latter enabling gas frequently to displace the hitherto triumphant electric arc lamp. This Company have secured the lighting of Aldwych, the new thoroughfare leading from the Strand; having been able to guarantee a light equal to the electric arc, at a much lower cost per annum. Two years ago, we had in our district 49,263 public lamps, of which about 35,938 were flat-flame and only 13,325 incandescent. To-day we have 49,004 lamps, of which 31,989 are incandescent and 17,015 flat-flame. You will see the position is almost reversed. There is no doubt that for outdoor lighting gas has proved itself more satisfactory and cheaper than the electric light; and it is to be hoped that railway companies and other public bodies will soon realize these facts, seeing that the problem of successfully lighting large areas—such, for example, as railway stations—is almost identical with that of street lighting.

BURDEN OF RATES—THE REDEMPTION FUND.

Rates and taxes show an increase of £3107. This is a matter which is receiving the Directors' closest attention; and seeing that the payment for rates and taxes now amounts to over 3d. per 1000 cubic feet of gas sold, a great effort will be made at the next quinquennial revaluation to obtain some relief for the Company from this constantly increasing incubus. There is one item in this half-year's accounts which has not appeared before—namely, the sum to be carried to the redemption fund established under the provisions of the Company's Act of last year. At the rate of dividend now recommended to be declared, the Company, according to the Act, are bound to set aside £20,000 per annum towards this fund. The Directors, therefore, recommend that there shall be set aside a first instalment of £10,000 as the moiety of the year's payment. This will be applied in due course to the purchase and extinction of ordinary stock of the Company, as provided by the 1903 Act.

BALANCE AND DIVIDEND.

Shortly stated, the result of the past half-year's working is as follows: The gross revenue profits are greater than in the corresponding six months of 1903 by £58,377, while the charges for dividend and interest are higher by only £1201. This increased charge is not due to any issue of additional stock, but to a slight increase of interest on temporary loans. The net profit, after allowing for the £10,000 carried to the redemption fund, is therefore £47,176 more than in June, 1903. The amount available for distribution, after providing for the fixed charges, is £619,326 7s. 9d., out of which the Directors recommend (after setting aside the above-named sum of £10,000 towards a redemption fund) the payment of a dividend on the ordinary stock of the Company at the rate of £4 8s. per cent. per annum. This will leave £273,975 19s. 9d. to be carried forward to the credit of the current half-year's accounts.

REDUCTION IN THE PRICE OF GAS.

The satisfactory result of the half-year's working has enabled the Directors to reduce the price of gas by 1d. as from the 1st of July. At the last half-yearly meeting this matter was referred to; but the Directors then felt that the circumstances did not justify a reduction in the price. They, however, granted a certain amount of relief to large consumers, and to consumers of gas for power purposes, with, I am happy to say, very good results. The discounts allowed have enabled the Company to prevent the introduction of electricity for lighting and power purposes into many premises, and to keep many valuable accounts which were endangered. While fully appreciating the importance of the small consumers, the Directors feel that it is of the utmost consequence to retain the large ones, even if it involves some sacrifice. The small consumer also benefits by the retention of the large accounts, inasmuch as the more gas that is sold the lower the price is likely to be. The Directors trust that the reduction in the price by 1d., together with the granting of discounts, will show that they are alive to the necessity of supplying gas as cheaply as possible, and that it will lead to a further extension of the business of the Company.

COAL CONTRACTS AND THE SALE OF RESIDUALS.

Turning now to the future, the price of coal purchased for the next twelve months is lower by 7d. to 8d. per ton than that of last year; and the oil required for the same period has been bought at the same price as was paid under the last contracts. As regards residuals, the prospect is not quite so bright as we should like. Coke is of less value (largely on account of the unsatisfactory state of the trades which use it for fuel); and several other residual products are scarcely likely to fetch the high prices obtained during the past twelve months. In particular, the exceptional prices realized for pitch are no longer obtainable; and this residual has resumed what may be considered its normal price.

REPORT OF THE DEPARTMENTAL COMMITTEE.

The most important event of the half year in Metropolitan gas affairs has been the sitting of the Departmental Committee appointed by the Board of Trade "to inquire and report as to the statutory requirements relating to the illuminating power and purity of gas supplied by the Metropolitan Gas Companies, and as to the methods now adopted for testing the same, and whether any alteration is desirable in such requirements or methods, and, if so, whether any consequential alteration should be made in the standard price of gas." The Committee sat on 21 occasions, and heard evidence from the Gas Referees and the representatives of the London County Council and of the Metropolitan Gas Companies. The report, which was issued in June, is full of interest, and contains much material which is of the highest importance to the gas industry, more especially in the Metropolis. Mr. Corbet Woodall, a Director, and Mr. Trewby, the Chief Engineer, were the Company's principal witnesses—the evidence being highly technical; and when the Blue-book comes to be published, I think that those of you who may puruse it will find that the Company's case was presented fully and most ably. The subjects on which evidence was heard included the illuminating power, purification, calorific value, and method of testing gas, the powers of the Referees and the Chief Gas Examiner, the imposition of fines for deficiencies, and the sliding-scale of price and dividend. The Committee, after generally summing up the result of their inquiry, made these recommendations:—

(*a*) That the standard burner to be used for testing the illuminating power of all qualities of gas should remain, as at present, the Sugg "London" (No. 1) argand burner, and that the chimney to be used therewith should be of uniform size—namely, 6 inches long and 1⅛ inches internal diameter.

(*b*) That for the purpose of determining the nominal illuminating power of gas of any quality, the gas should be burnt in the standard burner at the rate of 5 cubic feet an hour.

(*c*) That provision should be made for official testing of illuminating power in a flat-flame burner, of a kind to be prescribed by the Gas Referees, and that the result of such tests be recorded and notified to the various Authorities and Companies concerned and to the Board of Trade.

(*d*) That official tests of the calorific power of the gas supplied by each Company should also be made, recorded, and notified as above.

(*e*) That the existing statutory provision which requires the gas to be wholly free from sulphuretted hydrogen (which is, in fact, impracticable) should be modified, and that for the future the test which the gas should be required to pass should not be more severe than that specified in the schedule to the Gas-Works Clauses Act, 1871.

(*f*) That the obligation placed upon the Companies with regard to the removal of the sulphur impurities (other than sulphuretted hydrogen) should be abolished, but that testing for information only should continue to be made in such manner and to such extent as may be prescribed by the Gas Referees.

(*g*) That the gas to be tested should be brought direct from the main to the testing-room by a single service-pipe without tap, branch, or connection.

(*h*) That in case of difference between the Gas Companies and the Gas Referees as to the reasonableness of any requirements of the Referees, the decision of the Chief Gas Examiner should be conclusive.

(*j*) That, except as may be involved in the foregoing recommendations, the powers and duties of the Gas Referees should remain as at present.

(*k*) That it should not be obligatory upon the controlling authority to test on Sundays.

(*l*) That the duties of the Chief Gas Examiner should include the hearing of all applications by the controlling authority for the recovery of forfeitures in respect of illuminating power, purity, or pressure, and the assessment of the forfeitures to be paid by the Company in all cases except those in which he is unable to certify that the default is not substantial, or that it is not due to careless conduct of the works.

It will thus be seen that the Committee do not think that any alteration should be made for the present in the standard burner and mode of testing this Company's gas. They propose, however, that, for the purpose of keeping a record only, the gas should, in addition to the present test, be tested in a flat-flame burner, and also that the gas should be tested for calorific power. In connection with this, it is necessary to read clause 4 of the report, which is as follows:

Although a large part of the gas used for lighting purposes is used with incandescent mantles, for which the illuminating power of the gas is in itself of no value, a considerable proportion is still consumed in flat-flame burners; and while this is the case, the Committee feel it is desirable that testing in respect of illuminating power should be maintained. At the same time, it is clearly anomalous that while such testing is only required in the interests of those consumers who continue to use flat-flame burners, the tests should be made with an argand burner, which is of a wholly different type, and is practically never used by the public.

Although nothing is said in the recommendations of the Committee as to any consequential alteration in the standard price, they ought to be read in conjunction with paragraph 19 in the report, which deals with this subject as follows:

The relaxation of the requirements with respect to sulphur purification will undoubtedly be a great relief to the Companies, to whom the existing tests cause great trouble and anxiety; but the Committee do not think that the pecuniary advantage is, in itself, sufficient to justify them in recommending any consequential reduction in the standard price of gas. The Committee suggest, however, that the removal of these onerous regulations would furnish an appropriate occasion for revising the present arrangements of the sliding-scale, and substituting for them arrangements in which the standard price and the rate of variation of dividend would be fixed so as to give the Gas Companies greater incentives to economy, while being equally favourable to the public under normal circumstances. In revising the arrangements, it would be well to bear in mind that the larger proportion of gas consumed is even now used for purposes for which the calorific value is the important point.

The Directors, as has been said in the report, are, on the whole, satisfied with these recommendations, especially with that which deals with the proposed modification of the sulphur clauses. There is, however, one of the recommendations as to testing for illuminating power, which, we think, is regrettable—viz., that the gas, while being tested, should be consumed at the rate of 5 cubic feet per hour. This method of testing will not give full credit for the illuminating power of the gas supplied in the Metropolis, whether nominally 16 or 14 candles. However, the decision of the Committee is given, and we must make the best of it.

A MOVE TOWARDS LEGISLATION.

If then, as has been said, the recommendations are, on the whole, satisfactory, and as effect can only be given to them by Act of Parliament, the important question is how this can best be done. Two courses seem to be open—viz., that the Board of Trade, or, in other words, the Government, should introduce a Bill embodying the recommendations; or that the three Companies should promote, or get promoted, a Bill with the same object. There is ample time to consider the policy and the method of pursuing it; and I can only say, for myself and colleagues, that we are desirous of, and shall be prepared to aid in, arriving at a satisfactory conclusion on this most important question in conjunction with the Board of Trade and with the other Metropolitan Gas Companies. Since I arrived this morning, we have received a communication from Whitehall, from which it appears that the Board of Trade are not yet decided as to whether or not they will introduce legislation. This is in reply to a communication from the London County Council, who seem desirous of themselves dealing with the matter by introducing a Bill. It is suggested in the letter of the Board to the London County Council that the Gas Companies would probably desire to introduce legislation. As it seems to be the wish of all parties to see effect given to the recommendations of the Committee, it appears to me that it ought not to be difficult to pass an agreed Bill for giving legal force to the recommendations, under the auspices of the Board of Trade.

THE PORTABLE PHOTOMETER AND GAS TESTING.

A matter of great importance considered by the Committee was the proposal of the London County Council to legalize the use of the portable photometer for penalty testing. I am glad to say that the Committee were of opinion that so long as permanent forms of enrichment, such as those now used by the London Gas Companies, are employed, the existing law provides ample machinery and opportunity for testing the bulk of the gas supplied by each of the Companies, and that there is no need for further provision. That, I hope, is the death-knell of the portable photometer. The Committee were therefore not prepared to recommend the adoption of the further tests proposed. We have thus, it is hoped, now heard the last of the portable photometer—an instrument which, had it been legalized, would not only have given unreliable results, but would have involved the Companies (and therefore the gas consumers) in very great and altogether unnecessary expense. While speaking on the question of gas testing, I may explain that the forfeitures mentioned in the Official Auditors' certificate to the half-yearly accounts were incurred in respect of a few cases of slight deficiency of illuminating power spread over a period of some eighteen months; decisions on the Company's appeals in most of these cases having been suspended for a considerable time. The fines, though trivial in amount, have, in accordance with the provisions of the Act of Parliament, to be deducted from divisible profits and by way of reduction of dividend.

THE ST. MARYLEBONE ELECTRIC LIGHTING BILL.

The most important Bill which the Company had to deal with during the present session was the Electric Lighting Bill promoted by the Marylebone Borough Council. We opposed this Bill with the view of obtaining protection for the Company, both as ratepayers and as a gas company; and I am glad to say we were successful in getting a clause inserted in the House of Lords which affords the desired protection. The clause obtained is, we believe, an improvement on the well-known Bermondsey clause, inasmuch as it contains a provision which will prevent the Borough Council from making up any loss they may sustain in supplying electricity to private customers by charging the ratepayers a high price for the supply to public lights. Before leaving this subject, I should like to say a word in defence of gas companies against a charge that has been brought against them in connection with their endeavours to obtain the insertion of such protective clauses in this and similar Bills. It has been said that the companies desire to cripple the municipal electric light undertakings. This assertion certainly does not correctly describe the attitude of the companies; they have no wish to cripple the purveyors of the rival illuminant. They only desire to receive fair play; and they are bound to protect themselves, as far as possible, against a competition which is unfairly carried on by the aid of the rates to which they themselves are such very considerable contributors.

BILLS WITHDRAWN.

The Bill promoted by the London County Council for the purpose of amending the law of procedure in gas-testing appeals was withdrawn on account of the appointment of the Departmental Committee. The London Port and Docks Bill, promoted by the Dock Companies, has also been withdrawn; and the Government has, within the last few days, dropped the Port of London Bill, which, it will be recollected, was suspended from the previous session of Parliament.

THE SECRETARY'S SALARY.

I have only one other matter to mention, and it is this: It will be remembered that this time last year, on the retirement of Mr. Field from the post of Secretary and General Manager, Mr. Rayner succeeded to the office of Secretary, and that the shareholders fixed his remuneration, on the suggestion of the Directors, at £700 per annum, rising by three yearly instalments of £100 to a maximum of £1000 per annum. Sir George Livesey suggested that it was too low a salary for the office, bearing in mind the importance of the duties to be performed; and he was prepared to move an amendment fixing it at £1000 at once. It was ultimately arranged that the motion should stand, but that his amendment should be brought forward at this meeting; and the Directors have much pleasure in carrying out the undertaking, and suggesting to the proprietors that they should now fix the Secretary's salary at £1000 per annum. The year's experience of the way in which their new Secretary has discharged his duties fully justifies their selection of him for the post.

THE MOTION TO ADOPT THE REPORT.

I now beg to move:—"That this meeting do agree with and confirm the report of the Directors and the Auditors' report and statement of the accounts of the Company, as transmitted to the proprietors on the 28th ult."

The DEPUTY-GOVERNOR (Mr. H. C. Ward) seconded the motion.

A SHAREHOLDER asked why, if the amount carried to reserve was far in excess of the sum carried forward in the corresponding half year, an increased dividend was not to be paid.

The GOVERNOR replied that the dividend under the sliding-scale depended upon the price charged—that a reduction in price for the whole year would carry with it the power to increase the dividend. There had been no reduction which would carry an increase of dividend for the past half year.

Mr. BAILEY asked whether the shareholders would reap the benefit of the reduction during the next half year.

The GOVERNOR replied that the proprietors would not reap the benefit from the reduction of the price except from Jan. 1 next year.

Col. RODNEY MUNDY thought this a great mistake, and said he was sure many other shareholders would agree with him. The accounts were made up half yearly; and when the reduction of 1d. per 1000 cubic feet was made to the public from the 1st of July, the shareholders ought to reap a benefit from the same date, and not from the 1st of January next. He could not understand why the Company should give a reduction for six months and derive no benefit from it.

The GOVERNOR replied that they had no power to vary the dividend in respect of the reduction made for the current half year. The Directors felt that, as a matter of policy—and, to some extent, of justice—they should take the earliest possible opportunity, having a large balance in hand, of making a reduction to consumers, and thereby encourage the consumption of gas.

CONGRATULATIONS AND ENCOURAGEMENT TO UNITED ACTION.

Sir GEORGE LIVESEY: With reference to the question asked by a shareholder, I may say that most gas companies have had their sliding-scale arrangement fixed for the year. But it is a common thing, when going to Parliament, to get it altered to half yearly; and, as you are going to Parliament, that may be managed. I rise more particularly to congratulate you, Sir, on the very satisfactory condition of the Company, and on the excellent address you have delivered. It is a great satisfaction to gas people to feel that the premier Gas Company of the world is going ahead again in the direction of recovering the position which it ought to hold. I am very glad indeed to learn that you have seen your way to reduce the price of gas by 1d.; and I may say that all the three London Companies have done the same as from June. The Commercial Company so decided yesterday. A reduction of 1d. does not sound much; but in your case it represents between £80,000 and £90,000 a year, and therefore it is a very considerable sum in the aggregate. I think it is better to go by gentle steps, rather than to take a big one. I am also pleased to hear what you say about the result of the discounts. I have had experience of that system; and I am glad to hear it is corroborated by what you say. But the greatest pleasure I have, in congratulating you on your speech, is your remark with reference to the report of the Departmental Committee of the Board of Trade. I was very glad indeed to hear you say that you hoped the three London Companies would put their forces together, and carry

out the recommendations of the Committee as far as possible. They are very important. We have been in a condition of thraldom for 40 years; but now the outworks are carried, and we have only to go in and take possession of the fort, which we shall do very soon. I do not wish to go into details here, because they are more for the private consultation of the three Companies. But I do think that the recommendations of the Departmental Committee are so satisfactory, on the whole, that it would be a great mistake if we cannot agree on a Bill; and, if we can agree with the Board of Trade, we need not trouble about the London County Council. My own impression is that the London County Council will not agree. They are like the Russians; and I hope I may say we are like the Japanese. (Laughter.) If so, the augury is all in our favour. But, if the London County Council will not agree to the recommendations of the Committee, then it will be for the three Companies to go ahead. I can speak for the other two Companies, that they will be very glad to co-operate with you. This matter was discussed by the Commercial Company yesterday; and it was agreed that the three Chairmen should have a meeting to talk the matter over. That being so, I think there is a good promise and hope of success. I again congratulate you, and also the shareholders and the public, on the position of the Company.

Mr. BAILEY asked whether the £10,000 redemption fund would be applied to the purchase of stock in the open market at once.

The GOVERNOR replied that the stock would be purchased in the pen market next year.

POSITION OF THE SUBURBAN COMPANIES.

Mr. A. M. PADDON said that the Governor's speech, although somewhat discursive, was, as always, interesting; and the chief point he would like to refer to was with regard to testing the gas. He quite agreed that the report of the Departmental Committee was as satisfactory as the report of any such Committee could be. The Committee did not sit to look after the interests of the Gas Companies alone; and, although the Committee sat to consider exclusively the interests of the three great Gas Companies, unfortunately, there were a large number of Suburban Gas Companies whose fortunes were somewhat linked with the three London Companies in the matter of testing gas. He noticed that there was an alternative given in the method of testing, which might be a hardship or an advantage. But as it involved the interests of the Suburban Gas Companies, they were carefully watching what was taking place; and he ventured to suggest that if a Bill could be agreed upon between the three paramount Companies, the Suburban Companies should be consulted, so that they also might secure whatever advantage was to be gained. The fact that so many Suburban Companies were behind the three great Companies would not weaken any appeal to Parliament—on the contrary, he thought it would materially help the appeal. If the three Companies were going to meet together in council, he would suggest that the Suburban Companies also should be consulted, so that any application to Parliament might have greater weight.

Mr. C. E. JONES said that he was somewhat surprised to hear that the Governor was in favour of the 5 cubic feet per hour for gas testing, which he thought was a far-fetched idea, having regard to the fact that the tendency in all cases was to reduce the illuminating power. To his mind, this was one of the weak points in the report of the Board of Trade Committee. The greatest boon that could be conferred on gas companies was the removal of the sulphur clauses, which had always entailed great expense on the companies. He also joined in the congratulations from the shareholders' side of the table on the lucidity of the Governor's address.

The GOVERNOR: I may remind Mr. Jones that I have already said that we are not in favour of the 5 feet per hour consumption for testing. But I also said that we have to take the recommendations as a whole; and it might be very difficult indeed to pick and choose, and say, "We will accept this and refuse that." At any rate, you may safely leave the matter to the Directors to do the best they can. With regard to what Mr. Paddon has said, as to the Suburban Companies, he is quite right in pointing out that on this Board, and other Metropolitan Boards, there are gentlemen who are intimately connected with the Suburban Companies; and therefore their interests will not be lost sight of. The difficulty in carrying out his suggestion is this: The Bill, I take it, will be one to carry out the recommendations of the Committee, which was appointed to deal with the three Metropolitan Companies only; and whether it will be in the power of the Suburban Companies to seek to appear on the Bill, and ask to be incorporated as regards certain recommendations and regulations, I am not prepared to say. I think the learned gentleman probably knows more than I do about that, because his experience is more recent than mine as a parliamentary practising barrister. So if the variations which are put in force by these new regulations are for our good, presumably they will be also for your good. I am afraid I cannot carry it farther than that. I quite agree with Sir George Livesey when saying that we have been in bondage, or rather in the Wilderness, for 40 years; and now it looks as if the Promised Land was in sight, and that we may, by judicious management, arrive at the conclusion which we wish for so much. I also accept his suggestion that when we go to Parliament we should consider whether or not we may bring ourselves into line with the half-yearly operation of the sliding-scale. I think I have now dealt with every question asked.

Sir GEORGE LIVESEY: With reference to the Suburban Companies, I may say that the Crystal Palace District Gas Company have a clause that their gas shall be tested in accordance with the regulations of the Gas Referees for the Metropolitan Companies. As Chairman of that Company (and my friend Mr. Hunt is on the Board), we shall take care that their interests are not jeopardized.

The motion was then put and carried unanimously.

THE DIVIDEND.

The GOVERNOR next moved a resolution authorizing the payment of the dividends recommended in the report.

The motion was seconded, and carried unanimously.

THE SALARY OF THE SECRETARY.

The GOVERNOR said the next business related to the Secretary's salary, and he asked Sir George Livesey to take charge of the resolution, as he had brought it forward last year.

Sir GEORGE LIVESEY said he thought the resolution had better come from the Chair.

The GOVERNOR pointed out that, under the Act, it was the duty of the shareholders, and not of the Directors, to fix the salary.

Sir GEORGE LIVESEY said that, under these circumstances, he moved, with great pleasure, the resolution fixing the salary of the Secretary at £1000 a year.

Mr. BAILEY seconded the motion, which was carried unanimously.

VOTES OF THANKS.

On the motion of Mr. BAILEY, a hearty vote of thanks was passed to the Chairman, Directors, and Staff.

This was briefly acknowledged by the GOVERNOR; and the proceedings terminated.

BRENTFORD GAS COMPANY.

The Half-Yearly Ordinary General Meeting of this Company was held on Friday, at the Charing Cross Hotel—Mr. HOWARD CHARLES WARD in the chair.

The SECRETARY (Mr. William Mann) having read the notice convening the meeting, the report and accounts [which were noticed in last week's "JOURNAL," p. 342] were taken as read.

The CHAIRMAN, in moving the adoption of the report and accounts, said that the former amounted just to this—that the sum of £95,892 was available for dividend. The dividend, which would be payable on the 1st prox., would amount to £37,550, leaving £58,342 to be carried forward to the credit of the current half year. The increase in the consumption had been very satisfactory; in fact, he thought it had been rather larger than in the case of most of the Suburban Companies. It had amounted, as shown in the accounts, to 5¾ per cent. But though there had been a satisfactory increase in the sale of coke, amounting to £2500, for the half year, there had been a decrease in the sum received for tar and tar products (by reason of the Company having had a very good contract up to this time) to just about the same extent. The sum that had been received for the ammoniacal liquor, &c., was £400 more than in the June half of 1903. The profit for the half year, as compared with the corresponding period of 1903, was about £69 more; but then it had to be remembered that the Directors had reduced the price of gas, as from Lady Day last, by 2d. per 1000 cubic feet. This 2d. per 1000 cubic feet for the three months represented a sum of very nearly £3200; so that if the price of gas had not been reduced, the profit would have been this much more than appeared in the accounts. Then there was another matter which he thought he ought just to mention. There was an item on the receipts side of the revenue account, "Rental of prepayment meters and fittings, £4781." The amount in respect of this item for the half year to June, 1903, was £5821. Although, therefore, they had got more meters and fittings, and so on, the rental for the past six months had been considerably less. The reason for this was that they had just made an alteration in the system—an alteration which would be permanent in the future. Like nearly all gas companies, they had a very large number of these prepayment meters; and it was, of course, almost impossible for the collectors to take all the money from them during the last month of the half year. The result was that there had to be a very large sum of money in these meters which had not been actually received by the Company, though, of course, it had been paid in respect of gas used during the six months, and so really and properly belonged to the rental for that half year. However, the Board had thought it well to alter the existing system, and to bring into the rental only money absolutely received and paid over to the bankers. The money remaining in the boxes, which had not been brought into the present account, would go to benefit the current half year. All the works, he might say, were in first-rate order, and fitted to do a great deal more than was at present required of them. The capital account, too, was in a most satisfactory state. It would be seen that by their system of writing off depreciation on the meters and stoves, and writing off, as allowed by the Official Auditor, £1500 as the half-year's depreciation of fixed plant, although some £13,000 had been spent out of capital during the six months, still the capital account was £750 less at the end of the half year than it was at the beginning. He thought that was a very satisfactory thing. In point of fact, the capital account had decreased by 7d. per 1000 cubic feet during the half year; and this spoke very well for the material progress of the Company. Of course, if they took the dividend paying and interest bearing capital, it was rather less—that was, 8s. 11d. per 1000 cubic feet; but the money that had been really spent and charged to the Company was now about 10s. 8d., as against 11s. 3d. at Christmas last. There was one other matter to which he thought he ought to call attention; and this was that they had been troubled during the period under review—he did not believe that it was peculiar to the Brentford Company, but that almost the whole of the gas companies in England had been troubled in the same way—by the local authorities embarking in municipal trading. Everyone knew what they did. They started such things as electric lighting, and founded works and distributed current for public illumination and private consumption; and they did it virtually on the security of the rates. Now they, as the Gas Company, were among the largest ratepayers in the district; and they naturally objected to such a course. He was, however, happy to say that Sir George Livesey, in one notable instance, got inserted what was known as the "Bermondsey clause;" and the Gaslight and Coke Company, in the case of Marylebone taking over the electric lighting, had even a better clause, because not only must the authority publish their accounts, but they were strictly forbidden to burden the rates with any portion of their loss. This would have a very beneficial effect. At West Ham, the rates had been most heavily burdened; and it was most important that the local authorities should be curbed. The Hanwell Municipal Authority had sought a Provisional Order from the Board of Trade to establish electrical works and sell current for public and private purposes; and he was happy to say that the Company had secured protection of a similar kind from the Duke of Northumberland's Committee. This would have a very good

effect. All that remained for him to do was to congratulate the shareholders on the very satisfactory half year the Company had had; and he expected that they would go on very much in the same way. Comparing the June half of 1904 with the corresponding period of 1903, they had an increase of 1322 ordinary consumers, or about 5 per cent.; and the prepayment consumers had grown from 24,837 to 26,445, or about 6½ per cent. They had also an increase in ordinary stoves of 9·1 per cent., and in prepayment stoves of 6·87 per cent. They would see, therefore, that the Company was still treading the path of progress.

Mr. ULICK J. BURKE seconded the motion.

Mr. H. D. ELLIS inquired what was the Company's initial price.

The CHAIRMAN replied 3s. 9d. per 1000 cubic feet.

Mr. ELLIS: At the unreduced price of 2s. 11d. per 1000 cubic feet, your authorized dividend would be 12½ per cent.?

The CHAIRMAN: We put ½ per cent. to the reserve fund, or £3394; and we have also £5000 put by as an insurance fund. I think that is a proper thing to do.

Mr. ELLIS: I had rather formed an expectation that you might have been in a position to declare a rather larger dividend on this occasion. The accounts are so very good. The increases have been so large; and you have written down the capital, and carried £5000 to insurance.

The CHAIRMAN: The reserve fund, of course, must be made up out of what is legally divisible as dividend; and we think it is best to get up the reserve fund for the benefit of posterity. I believe it is wise.

Mr. ELLIS: So do I, to a certain extent.

The resolution was then carried unanimously.

On the motion of the CHAIRMAN, seconded by Mr. BURKE, dividends were thereafter declared (subject to income-tax) at the rate of 5 per cent. per annum on the 5 per cent. preference stock, 12 per cent. per annum on the consolidated stock, and 9 per cent. per annum on the new stock (1881).

Mr. OKE, in proposing a vote of thanks to the Chairman and Directors, said the report was a most satisfactory one; and he hoped the time would soon come when the shareholders would be able to reap the full benefit of the very substantial reduction to the consumers. He was glad the Directors had obtained the clause referred to with regard to the electric light. It would be not only to the benefit of their Company, but to the gas world generally.

Mr. J. REESON seconded the motion, which was carried.

A brief acknowledgment by the CHAIRMAN brought the proceedings to a close.

CRYSTAL PALACE DISTRICT GAS COMPANY.

Half-Yearly Report and Accounts.

The following is the report of the Directors of this Company for the six months ending the 30th of June, which, with the accounts, will be presented at the half-yearly general meeting next Friday.

The Bill promoted in the present session was opposed, as was that of the previous year, by the Local Authorities, who appealed to the Board of Trade, at whose request the clauses to give relief from the necessity to supply gas of higher illuminating power than can be obtained from the available supply of coal, and to abolish the nuisance of purification by lime, were withdrawn, on the ground that the Departmental Committee which they had "appointed to inquire and report as to gas testing in the Metropolis" was not likely to complete its work in time to embody their conclusions in the Company's Bill. The non-contentious clauses of the Bill, which has now received the Royal Assent, are: (1) To calculate the sliding-scale dividend half-yearly instead of yearly; (2) to change the name of the Company to the South Suburban Gas Company as from the 1st of August; (3) to give the Company the option to offer stock in the first instance to the consumers and employees at the market price of the day, instead of by public auction or tender; (4) to give power to the Directors, with the consent of the shareholders and the Board of Trade, to formulate a scheme for the election of employee Directors, similar to that of the South Metropolitan Gas Company; and (5) to enable employees having stock in, or money on deposit not exceeding £100 with, the Company to nominate any person to receive such stock or deposits at death.

The Departmental Committee of the Board of Trade issued their report on the 19th of May. It makes no recommendation on the question of a reduction of illuminating power, but it emphatically condemns the use of lime for purification, on the ground "that the nuisance which is occasioned by the use of lime for extracting these sulphur products is very serious, not only by reason of the annoyance caused to the neighbourhood, but also by the deleterious effect on the workmen employed in connection with the process." The sulphur products referred to are, in the opinion of the Committee, not detrimental to the public.

There are no known means of removing these sulphur products, and the Company find it impracticable to reduce them by more than one-half, and even this results in grave complaints of nuisance from the inhabitants near the gas-works. They also find equal difficulty in increasing, without causing a nuisance, the illuminating power of the gas by the only practicable method of enrichment—viz., a mixture of carburetted water gas; and although it brings the nominal illuminating power up to the parliamentary standard, the mixture is certainly not so good for the consumers as simple coal gas, especially for heating, cooking, and power, and in incandescent burners, which together use over 70 per cent. of all the gas supplied by the Company. The Directors have therefore taken the bold course of issuing a circular to their consumers informing them that, having failed, through the opposition of the Local Authorities in two successive sessions of Parliament, to obtain relief from onerous and useless restrictions, they have resolved to abolish the causes of complaint by discontinuing the use of both lime and water gas. They ask for a fair trial of the experiment from the consumers and the Local Authorities. If the former are satisfied, the latter can have no real ground for complaint.

The circular to consumers informs them that the abolition of water-gas enrichment will effect some saving in manufacture; the Engineer estimates it at about ½d. per 1000 cubic feet, or £2500 in the year. The Directors have therefore announced a reduction of 1d. per 1000 cubic feet, or £5000 a year, to the consumers, in order to make sure that they shall have the full benefit of the saving. The Directors also have pledged the Company for the next twelve months not to divide the extra 2s. 6d. per cent., or £719, among the shareholders, to which they would otherwise be entitled under the sliding-scale by the reduction of the penny in the year. The price of gas from Midsummer is thus brought down to 2s. 5d. per 1000 cubic feet.

The price of gas was reduced from 2s. 7d. to 2s. 6d. per 1000 cubic feet from Christmas last, which entitles the shareholders to a dividend at the rate of 5½ per cent. per annum. The accounts for the half year show a satisfactory amount of profit; the Directors therefore recommend the payment of the full dividend. They have carried to the insurance fund £2200—equal to ½ per cent. on the paid-up capital, in accordance with the Act of Parliament; and there remains to carry forward to the next account the sum of £5830 14s. 10d., or £1400 more than was brought forward.

The attention of the shareholders is directed to the amount of £2507 16s. 5d. distributed among the employees, under the heading of "Co-partnership," in the year ended the 30th of June last. The Directors fully believe that this has been earned by better and more careful work; and the greater part of the co-partnership annual bonus is year by year invested in the Company's stock by the officers and workmen, who now hold in stock at the market price and on deposit at interest with the Company the large sum of £20,500. To make the co-partnership complete, it is necessary that the employees should share in the responsibility of management; and for this purpose the Directors submit a scheme for the approval or otherwise of the proprietors at the extraordinary meeting to follow the ordinary general meeting, whereby the employees will, in the future, be enabled, in accordance with the recent Act of Parliament, to elect two of their number to sit on the Board, as has been done by the South Metropolitan Gas Company, with all-round satisfaction, since 1898.

[A copy of the proposed scheme, as well as of the circular to the consumers (which was noticed in the "JOURNAL" for the 12th ult.), accompanies the report.]

The report is followed by the accounts, which are presented in the usual form. They show that the total amount of capital received up to June 30, including premium capital, was £788,415, of which £784,716 had been expended (£2013 in the six months). From the revenue account, it is seen that the sale of gas produced £82,997; rental of meters and stoves, £5273; and the sale of residuals, £24,190; rents bringing up the total receipts to £112,516. On the other side of the account, the manufacture of gas cost £65,705 (this total including £40,318 for coal and oil tar and £6904 for oil and coke for oil gas); distribution came to £9281; and management to £4164. The item of "Co-partnership" stands at £1307 (£2507 for the year), and other payments bring up the total to £88,538; leaving a balance of £23,978 to go to the net revenue account. The sum of £23,143 is applicable for distribution. The statements relating to the working show that 54,577 tons of coal and 406,746 gallons of gas oil were used in the manufacture of 561,311,000 cubic feet of coal gas and 145,330,000 cubic feet of oil gas (18·82 candles)—making, together, 706,641,000 cubic feet, of which 666,546,000 cubic feet were sold and 674,236,000 cubic feet were accounted for. The residuals produced were: Coke, 654,924 cwt.; breeze, 19,729 yards; coal tar, 580,110 gallons; oil tar, 61,011 gallons; and ammoniacal liquor, 11,291 butts. Of the total production of coke and breeze, 61,454 cwt. and 1300 cwt. respectively were used in the production of oil gas. There were 490 tons of sulphate of ammonia made and 453 tons sold during the half year.

ALLOA GAS DEPARTMENT.

Adoption of the De Brouwer Projector—The Past Year's Working.

The paper read by Mr. J. W. Napier, of Alloa, at the meeting of the North British Association of Gas Managers (given in the "JOURNAL" last week) furnishes evidence that the Gas Committee possess in their Engineer and Manager a man who is quite abreast of the times. Further proof of this is afforded by the fact that the Committee have decided to adopt the De Brouwer projector for charging retorts. The auxiliary plant will consist of a gas-engine and dynamo and a coal breaker and elevator, with the necessary storage hoppers. The charging-machine will be of the combined type, with the hopper on the machine, and will run on rails in front of the benches. There are eight ovens of eight retorts each, and three of six each; the retorts being back to back. It is intended that the machine should travel round the retort-house until the retorts are made throughs. It is interesting to note that this is the first installation of the De Brouwer plant north of the Tweed.

While referring to Alloa, it may not be out of place to give some few particulars in regard to the working in the year ending the 15th of May last. The total income was £13,970, against £13,181 in the year 1902-3; the expenditure being £12,718 (including £955 for interest and £1555 added to the sinking fund), compared with £12,429 (including £958 and £1390). The profit balance was £1252, or at the rate of 8·96 per cent. and 3·11d. per 1000 cubic feet of gas made, compared with £751, or at the rate of 5·72 per cent. and 1·85d. per 1000 cubic feet of gas made. The gross cost per 1000 cubic feet of gas made was 2s. 1·33d. last year, against 2s. 0·85d. in 1902-3; the net cost in the two years being 1s. 5·08d. and 1s. 6·67d. Going back to 1894, the total cost of manufacture per 1000 cubic feet on a make of 40,800,100 cubic feet was 2s. 11·69d.; the price charged being 4s. 7d. Last year the cost was 2s. 7·37d. on a make of 96,377,700 cubic feet; the prices being 2s. 2d. and 2s. Meter-rents have been abolished since 1894.

AMBULANCE WORK AND CO-PARTNERSHIP IN A SOUTH LONDON GAS-WORKS.

Last Wednesday afternoon, an interesting ceremony took place before a crowded audience in the Institute Hall, at the Rotherhithe Station of the South Metropolitan Gas Company, when Sir George Livesey presented a challenge trophy offered by the Company for competition annually between the ambulance corps of the different stations. Instead of the more generally used cup or shield, the trophy took the form of a handsome illustration in Doulton ware, encased in a massive frame, of the parable of "The Good Samaritan;" and on this occasion (the first on which it had been competed for) Rotherhithe had supplied the winning team. In making the presentation, Sir George said he hoped that the lesson taught by this story would be kept in mind by all. Anyone needing help was their "neighbour;" and it was their duty and privilege to assist him. He trusted that all—Directors and officers and men—would regard each other as "neighbours" in the highest and best sense. The more they did to help and benefit their neighbours, the happier they would be, and the better the world would be. He also, on behalf of the men of the station, presented mementoes of the occasion (in the shape of silver medallions) to the four members of the winning team, as well as various prizes to other men which had been provided by the Rotherhithe Works Institute for a competition of their own.

Subsequently, Sir George addressed those present on the subject of the co-partnership system, which he said had up to now been a wonderful success, owing to the hearty co-operation of the great majority. The Company had distributed £34,341 in the shape of bonus for the twelve months just ended. This was a vast sum of money; and it was necessary to so use it that it would permanently benefit the recipients. The position of the working man was that he had his nose to the grindstone all through his life, and did not become the possessor of property—if he did, it would be a vast benefit to him and to the country. The Directors thought they had solved the difficulty; they had made use of their profit-sharing system as a basis whereby men might become property owners, and so improve their position. This was the reason why certain restrictions had been placed upon the withdrawal of the money. At first, the whole of it was withdrawable; and then, in 1894, they made it half withdrawable and the other half to be invested in stock. Since the latter year, they had been trying their best to persuade those men who every year withdrew what they could to save it. Those who saved their bonus were the salvation of the system; and if all had withdrawn it year by year, there would have been no profit-sharing to-day. The time had now come when the men must either leave their bonus in or be cut out of the scheme altogether; and so a rule had been adopted that they must not withdraw it except for some really good reason.

NEWPORT (MON.) GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Wednesday, at the Company's Offices, Newport—Mr. R. LAYBOURNE in the chair.

The report and accounts (noticed last week) having been presented,

The CHAIRMAN, in moving their adoption, said the number of coin meters now in use was 7659, and of cooking stoves on hire 9218. No fewer than 677 cookers and 45 gas-fires had been fixed during the half year ending in June. This progress was very satisfactory, in face of the competition the Company had to meet, and also the economy effected in the use of gas owing to the introduction of incandescent burners. But for the increased number of cookers and coin meters, there would probably be a decreased consumption. The reduction in the price of coal had not come; but they had received some relief in respect to the sale of residuals, though not to the extent they had hoped. There was one item in the accounts—that for rates and taxes—which was an ever-growing one, and one over which they had no control. This increase was largely contributed to by the reckless expenditure of the Local Authorities in their schemes, many of which were perfectly worthless and unremunerative. Notwithstanding this, however, they had to be paid for; and the ratepayers suffered for it. The failure of these authorities to realize the advantages of gas, as compared with other modes of lighting, was astonishing. Others had abandoned different modes of lighting, and had gone back to gas, even in cases where the authorities generated electricity. He hoped the Newport Corporation would profit by the experience of these gentlemen, and, further, that the Company would have some relief from the rates. He trusted pressure would be brought to bear upon the Local Authorities in order to make them more economical.

Mr. T. G. CARTWRIGHT seconded the motion, and it was carried unanimously.

The usual dividends were then declared.

The retiring Directors and Auditor having been re-elected,

Dr. GARROD THOMAS moved a hearty vote of thanks to the Directors and officers of the Company.

The motion having been carried,

The CHAIRMAN said it was a pleasure on all occasions to come before the stockholders and find that the business was satisfactory.

The vote was also acknowledged by Mr. T. CANNING (the Engineer) and Mr. T. H. HAZELL (the Secretary), and the proceedings closed.

Assessment of the Tynemouth Gas-Works.—Among other cases, the Tynemouth Assessment Committee recently had before them the objection raised by the Tynemouth Gas Company to the amount of the new assessment of their undertaking. Mr. Bramwell, the Company's Solicitor, Mr. J. J. Carr, the Secretary, Mr. W. Newbigging, and Mr. W. Hardie, jun., the Engineer, appeared in support of the objection. The Committee eventually referred the matter to their Valuer (Mr. Hedley) and Mr. Newbigging.

THE LIGHTING OF KEW BRIDGE.

The above subject has been under the consideration of a Joint Committee of the County Councils of Middlesex and Surrey, who have reported to the following effect to the Middlesex County Council: The County Councils, in March, 1903, adopted resolutions agreeing to the Brentford Gas Company laying two 16-inch gas-mains across the new bridge, subject to the Company entering into agreements with the County Councils providing for the payment by the Company to each Council of a sum of £20 per annum for the way-leave; and the Company duly entered into an agreement with each Council. The old bridge had, prior to its being taken over by the contractor for reconstruction, been for many years lighted at the expense of the Gas Company; but upon the completion and opening for traffic of the new bridge, the Local Authorities on either side—viz., the Richmond Borough Council and the Brentford Urban District Council—were communicated with as to the lighting; each of these authorities being asked to undertake half of the bridge and the approach situated within their respective districts. The old bridge not having been lighted at the expense of the Richmond and Brentford Councils, these authorities hesitated to assume the responsibility for lighting the new one; and temporary arrangements were made for the bridge to be lighted by the Gas Company until the question was determined. The Richmond Council submitted a case to ascertain whether it was the duty of that authority to undertake the lighting of the Surrey half of the bridge and of the Surrey approach; and Counsel advised that they were under no liability of any kind in respect of the lighting of the bridge and approach. In view of this opinion, the Council and the Brentford Council declined to undertake the lighting of the bridge and approaches. Negotiations were therefore entered into with the Gas Company, with a view to their undertaking the lighting, instead of paying the way-leave of £20 a year to each Council. The Company have now, in consideration of the County Councils having allowed the two 16-inch mains to be laid down under the footpaths on the eastern side of the bridge and approaches, agreed to light the bridge and approaches and to enter into an agreement, the draft of which has been approved of by the Solicitors of the two Councils. The Joint Committee recommend that separate agreements should be entered into by the County Councils of Middlesex and Surrey with the Gas Company; and that on the completion of the proposed agreement, the existing agreements should be cancelled, and that any sums paid by the Company to the County Council under them should be returned to the Company. The agreements provide that in the event of the County Councils at any time requiring the Company to discontinue the lighting of the bridge, the Company are to pay to each Council the sum of £60 a year by way of rent for the privilege of continuing their mains across the bridge. The report and recommendations have been agreed to.

STOKE CORPORATION GAS SUPPLY.

The Past Year's Working.

At the last Meeting of the Stoke Town Council, the presentation of the minutes of the Gas Committee gave an opportunity to the Chairman (Alderman Geen) to offer a few observations on the working of the gas undertaking for the twelve months, ending in March.

Alderman GEEN said one of the most important features of the past year's operations was that the Corporation had reached the limit of their borrowing powers in respect of the gas-works—£85,000. Consequently, unless they obtained a further Act of Parliament, they would not in the future be able to borrow any more money in respect of capital expenditure. It must all come out of revenue—from which source the Committee had been endeavouring to meet such outlay for some considerable time. Of the £85,000, part had been repaid; leaving the present indebtedness £66,610. The loans had been taken up at varying rates of interest. The annual payment in respect of the sum borrowed, including interest and repayment of principal, was £3413. The next important feature to be observed was the income and progress of the works. The income from gas supplied to private consumers last year, after allowing for discount, was £17,832, against £17,514 in the preceding year; so that there was a very substantial increase in the consumption of gas. The other important item on the income side of the accounts was that of residuals. If they would look at the accounts they would find the income from this source had been considerably in excess of the previous year. The amount received—£5118—was equal to 64·2 per cent. of the cost of coal, against £4202 in the preceding year, which was equal to 49·02 per cent. of the cost of coal that year. Everybody, he thought, would be delighted at the marked increase in this substantial source of revenue. There were only two points in the expenditure to which he would call attention. The first was that on coal. They paid for it £7932, against £8486 before—a reduction of about £500, notwithstanding the fact that they carbonized practically the same quantity. Turning to the expenditure on mains and services, there also a large sum had been laid out, because the Committee had been alive to the fact that the number of houses in the borough was always increasing, and consequently the consumers as well. Probably what all would take most interest in was the question of profits; and looking at the figures as to profit earned—including the capital expenditure out of revenue—it would be found that had they been a company declaring a dividend to the shareholders they would have been able to pay 11 per cent. on the money invested. He thought this state of affairs would be considered highly satisfactory by the ratepayers. Out of the profits, the rates had benefited to the extent of £2085, against £1487 the previous year. Therefore the ratepayers not only had works second to none in the district, with a low capital, yet producing high and substantial profits. When they came to think that they carbonized 13,646 tons of coal, and that the make per ton was 10,334 cubic feet, against 10,115 cubic feet during the previous year, it would occur to anybody that great care, judgment,

and discretion must have been brought to bear by the Manager (Mr. W. Prince) and his staff. They would find also that the gas unaccounted for, which at all works was a question of serious moment, was only 7·08 per cent., against 8·19 per cent. before. This, no doubt, was due to a considerable extent to the Committee having replaced the old and worn-out mains, and attended generally to the services in the borough. The gas-mains of the town ran over a length of 34 miles; and it must be patent to everybody that a leakage of 7·08 per cent. was very low. There were in the borough 724 public lamps to clean, light, extinguish, and repair. Then they had 1048 cookers and stoves to look after. Rent had to be paid for these; and a large number of slot meters had been supplied, and the money had to be collected in respect of the gas consumed through them. In fact, there were more slot meters (2673) than ordinary ones (2249). Another remarkable feature in connection with the gas-works was that from 1894 to 1904 there was an increased make of gas of 65·6 per cent. In 1894, the make was 92,722,000 cubic feet; in 1904 it was 141,156,000 cubic feet. Ten or twelve years ago they were told it was impossible for the works to meet the demands of the gas consumers. They were told that within two years of that time the demand would be greater than the possible supply; and the recommendation was that new gas-works should be built upon a new site. He claimed for the Gas Committee some credit for having been able to carry on the works during the remodelling without any serious hitch; and he felt convinced that the ratepayers were to-day £40,000 or £50,000 better off than they would have been if the scheme then proposed had been carried out. Some three or four years ago, the Committee decided to discontinue the collection of gas-rents, and the inducement offered to consumers to pay their accounts at the offices regularly and punctually had been very successful. They charged 3s. 6d. per 1000 cubic feet, and allowed a discount of 5d. if the money were paid within a month. The clerks in the office checked each other, and if anything went wrong there must of necessity be collusion between at least three officials. The outstanding accounts were abnormally low when compared with what they were some years ago. The Committee had every confidence in their officials; but, as prudent business men, they did not consider it improper to institute and carry out with the utmost rigour all possible checks.

THE GAS INDUSTRY IN SOUTH AFRICA.

Opening for Gas-Engines.

The following remarks on the above subjects recently appeared in the "British South African Export Gazette."

Notwithstanding the fact that electricity has taken such hold on municipal bodies in South Africa, and that, from the biggest city down to the smallest dorp, aspiration is general to equip the towns with the latest electric services of lighting and tramways, and though the number of existing gas installations may be counted on the fingers, the use of gas is not wholly abolished, nor is its future a mere *cul de sac*. This arises from inherent advantages which gas and gas appliances possess, chief among which may be cited the economy of the gas-engine over steam for power raising. A salient instance in illustration was the invitation recently made by the Johannesburg Corporation for tenders for gas-engines and gas-producer plants, for erection as adjuncts to their electric lighting and power equipment; and the announcement that the Woodstock Corporation are erecting a 500,000 cubic feet capacity gasholder, supplied by the Whessoe Foundry Company, of Darlington, is another case in point.

It is, however, on the Rand mines more particularly where an enlarged future for gas-driven engines is opening out; and the opinion of Mr. G. A. Denny, the Chairman of the Company owning the Cinderella Deep Mine, is worth citing on the point. In his view, the use of gas-engines instead of steam offers many advantages to the mining engineer. He calculates that by their use a saving of 30 per cent. over steam might be effected, and in detail, the cost of gas per horse power per annum worked out, on a Rand mine, at £12 10s., against £25 for steam. This difference is, of course, very great, and allowance must be made for the warmth of an advocate; nevertheless that there is a fair margin in their favour is undoubted. For the working of high-speed batteries up to 200 stamps they offer special advantages, two of the greatest of which are the saving of room and ease of working. It is obvious from this that the gas engineer may look with renewed confidence to the South African market as an outlet for his plant; and wherever abundant and cheap coal is available, as is more particularly the case in the Transvaal, a great future lies before this industry, which is worth assiduous cultivation. On the mines, it may be added, there is an outlet for engines of very great power, with compact gas-producer plants. Elsewhere the call will be of a more general character.

New Water-Works for Ilkeston.—The formal ceremony of opening the new water-works at Meerbrook Sough by members of the Ilkeston and Heanor Water Board, composed of members of the Ilkeston Corporation and the Heanor District Council, took place recently. It is estimated that the new scheme will be sufficient to accommodate the needs of the Ilkeston and Heanor districts for the next 20 or 30 years. The minimum discharge of water at the Meerbrook Sough tunnel mouth is 14 million gallons per day; the maximum being 19 million gallons. Meerbrook Sough is an underground tunnel, commencing at the River Derwent, extending right across Wirksworth Valley and under the town of Wirksworth. The total length of tunnels is five miles, falling in depth below the surface from 700 to 500 feet at Middleton, and 250 feet under Wirksworth. The tunnel is comparatively dry overhead, and the water rises up through the floor. The water is hard, but it will be softened by Clark's process. The total quantity of water required is estimated at about a million gallons per day; and the works have been designed for this demand, keeping in reserve a capacity of about another million gallons per day to meet the requirements of the growing population.

INTERFERENCE WITH GAS AND WATER MAINS BY ELECTRIC TRAMWAYS.

As long ago as May of last year, an arbitration took place, under the provisions of the Tramways Act, 1870, between the East London Water-Works Company and the West Ham Gas Company and the West Ham Corporation, with reference to a dispute which had arisen between the parties regarding the necessity for altering the gas and water mains and services in consequence of the laying down of a tramway authorized by the Corporation's Act of 1900. No report of the matter was published in the "JOURNAL" at the time; but correspondence which has recently reached us (together with the fact that questions of a somewhat similar nature are often arising elsewhere) suggests that an account of the proceedings will be of considerable interest to readers.

The Origin of the Arbitration.

The proceedings were taken under section 30 of the Tramways Act of 1870, by which it is enacted that, for the purpose of laying down or renewing tramways, the promoters may, so far as is necessary or may appear expedient for preventing frequent interruptions of the traffic by repairs or works in connection with the same, alter the position of any mains or pipes for the supply of gas or water, &c.; and that before putting down a tramway in a road in which any mains or pipes, &c., may be laid, the promoters shall (whether or not they contemplate altering the position of any such mains and pipes, &c.) give seven day's notice to the company or person to whom such mains or pipes, &c., may belong, or by whom they are controlled, of their intention to lay down or alter the tramway, and shall at the same time deliver a plan and section of the proposed work. The section also provides that "if it should appear to any such company or person that the construction of the tramway as proposed would endanger any such main or pipe, tube, wire, or apparatus, or interfere with or impede the supply of water or gas or the telegraphic or other communication, such company or person (as the case may be) may give notice to the promoters to lower or otherwise alter the position of the said mains or pipes, tubes, wires, or apparatus in such manner as may be considered necessary, and any difference as to the necessity of any such lowering or alteration shall be settled in manner provided by this Act for the settlement of differences between the promoters and other companies or persons, and all alterations to be made under this section shall be made with as little detriment and inconvenience to the company or person to whom such mains or pipes, tubes, wires, or apparatus may belong, or by whom the same are controlled, or to the inhabitants of the district, as the circumstances will admit, and under the superintendence of such company or person or of their surveyor or engineer, if they or he think fit to attend, after receiving not less than 48 hours' notice for that purpose, which notice the promoters are hereby required to give." The Corporation were contemplating the putting down of certain tramways; and in accordance with the quoted portion of the section, notices were served by both Companies on the Corporation requiring them to execute certain alterations and works and to lower various mains and pipes. A dispute having arisen regarding the necessity for such lowering or alteration, the parties agreed to apply to the Board of Trade to nominate the Hon. Alfred Lyttelton, K.C., M.P., as Arbitrator to settle the questions between them, in accordance with section 33 of the Act, which provides that if any difference arises between the promoters and lessees, on the one hand, and any local authority or road authority, or any gas or water company, &c., on the other, with regard to such matters, it shall be settled by an Arbitrator.

The Case for the Water Company.

In opening the case for the East London Water Company, Mr. C. A. Cripps, K.C. (with whom appeared Mr. Douglas Bartley), explained that his clients were somewhat in the position of trustees, because they were not likely to have the status or the duties of a Water Company for very long; and therefore they considered it to be more important to preserve all the rights to which they thought they were entitled for the benefit, not so much of themselves, as of the public authority who would come after them. The West Ham Corporation were proposing to lay down certain tramways within their district, which, it was contended, would cause serious interference with the water-mains; and the question to be brought before the Arbitrator was as to how the Corporation ought to provide against this interference, so as not to put any burden either upon the Company or their consumers. The Company gave notice requiring the Corporation to alter the position of certain mains and pipes; and it was one of these notices that it had been agreed should be taken as a test case. In the first place, the Company considered that their mains ought to be moved laterally out of the tramway track, so that for all purposes they should have a proper and convenient access such as they had heretofore enjoyed. In some cases it would be necessary to lay a double pipe, one on each side of the tramway, so as to prevent any question of having to deal with the work of the tramway construction if the Company had to add fresh consumers or to make any additions to the mains. The matter between the parties might, he thought, on principle have been open to discussion; but there had been a case decided between the Ilford Gas Company and the Ilford Urban District Council,* which apparently settled the question so far as principle was concerned. At any rate, he looked upon it as guiding and governing his position in the present arbitration. [In that instance, it will be remembered, the construction of the tramways was said to have interfered with certain gas pipes and mains; the laying of the concrete bed and the formation of earthenware chambers for the cables having prevented the Company from connecting fresh service-pipes or getting at those already laid. Major-General Hutchinson, R.E., who was the Arbitrator, decided that the Council were to relay the mains for a distance of about 2½ miles, and bear the expenses of the arbitration. The Council unsuccessfully appealed to

* See "JOURNAL," LXXXI., pp. 168, 229.

set aside or remit back to the Arbitrator the award, on the ground that the Arbitrator had exceeded his authority.] The effect of the judgment of Lord Alverstone in that case, learned Counsel said, was that an Arbitrator appointed to determine a difference arising under section 30 of the Tramways Act, 1870, between the promoters of a tramway and a Gas Company, as to the necessity of lowering or altering the position of a gas-main, was not confined to considering whether the main itself was likely to be interfered with or endangered, but might consider the future effect of the construction of the tramway with reference to the connection of new service-pipes with the main. He might accordingly order the tramway promoters to lower existing gas-mains to such a depth that new service-pipes which might in future be required to supply houses with gas from the mains could be carried horizontally under the bottom of the concrete bed of the tramway. And, again, where a gas-main lay underneath or close to the proposed line of tramway, the Arbitrator might order it to be moved laterally by the promoters, to such a distance as to enable access to be obtained to it without interference with the concrete. Of course, he (learned Counsel) admitted at once that what ought to be done in this particular case must depend upon the particular conditions, though he did not think there could be any difference between gas-pipes at Ilford and water-mains at West Ham. The principle was that the Arbitrator might consider, not only any physical interference - and, he supposed, the probability of breaking the pipes or mains, or something of that kind—but the future effect of the construction of the tramway with reference to the connection of new service-pipes with the main—that was to say, the whole effect, substantially, of the tramway work, so that no additional burden of any sort should be put upon the Company beyond what they had to bear at the present time. He was asking for the same remedy which Major-General Hutchinson thought was a fair one in the Ilford case; but no doubt the Arbitrator would have to consider the special conditions. Having read the judgment of Lord Alverstone in the Ilford appeal (a verbatim report of which was given in the "JOURNAL"), and pointed out that section 32 of the Tramways Act—as to the rights of companies to open roads—did not cut down the protection to which the Company were entitled under sections 30 and 33, Mr. Cripps proceeded to call evidence.

The first witness was Mr. W. B. Bryan, the Engineer to the Company, who said he had received from the Corporation plans and sections of the proposed tramway work. The rails were flat-bottomed, and rested in a solid bed and foundation. From the surface of the roadway to the bottom of the concrete was about 1 ft. 1 in. The concrete was laid the whole width of the tramway, and a little way beyond the outer rail; the total width being just over 8 feet. This was for a single line; where there was a double line, the concrete would be twice that width. In some cases, the concrete went right across the street, from kerbstone to kerbstone; and there were instances in which the Company's valves came between the metals of the tramway—a very inconvenient position. He was of opinion that the tramways would affect the Company's mains, &c. For instance, in case of any repairs having to be effected, the time taken in getting at the pipes would be excessive. It would necessitate cutting through the concrete, and sometimes the rails, which would mean a stoppage of the traffic. He therefore served the Corporation with notice of what the Company required done to obviate the occurrence of such a condition of things. He then detailed the alterations the Company required made, which consisted of the lateral moving of some and the lowering of other mains, as well as the shifting of a number of valves so as to avoid the concrete, and the laying of several new mains. The mains, he said, varied much in depth, and the shallowest would touch the underneath side of the rail. In places the gradients of the streets would undoubtedly be improved for the purpose of laying the tramway; and if a little was taken off in certain places, this would, of course, bring the surface nearer the mains. If the mains and pipes were not altered at all, they would be fractured in places, and many joints would be loosened, which would cause leakage, and so necessitate repairs.

At this point, Mr. Danckwerts (who, with Mr. E. Morten and Mr. C. C. Hutchinson, appeared on behalf of the Corporation) intimated that where the pipes were so shallow as all that—if there were any such place—his clients had all along been prepared to lower them. He then proceeded to cross-examine witness, who, in reply to his questions, said it was obvious that it would cost more to pick away the concrete and get beneath the metals and the support of the tramway, and to shore that up, than it would if the roads were left in their existing position. The streets in West Ham were paved in different ways—with macadam, with granite, and with wood. In a macadam road, with no tramway, the pipes could be got at in the course of an hour or two; but if the tramway were there, the concrete would have to be broken up, and possibly, if the mains were under the rails, the traffic would have to be stopped until the repairs were finished. During this time, the people would be without water. If the pipes were moved laterally, there would be no expense caused by the shoring-up of the tramway or the breaking of the concrete; and the repairs would consequently be effected in much less time. The principal objection to having the valves between the rails was that it would stop the tramway traffic while the turncock was at work; but besides this, the stuffing-boxes had in many cases to be frequently packed. He estimated the cost of laterally shifting the mains from underneath the tramways, as desired by his Company, at about £6000—this was for the entire scheme, and included the necessary alterations to the communication pipes to all the houses. The general depth of the pipes laid before 1883 was from 2 feet to 2 ft. 6 in. Since then all new pipes had been laid 3 feet from the surface.

Witness was asked by the Arbitrator whether, assuming the roads were concreted from kerb to kerb, this would modify or alter the requisitions which the Company desired him to make with regard to the lateral movement of the pipes. Witness said it would not. What the Company wanted was the shifting of the pipes outside the actual line of the tramways, and not outside the concrete. Not a farthing had been put down in his estimate for anything but the actual tramway line.

Mr. John R. Strachan, who followed Mr. Bryan, stated that he thought the Company's requisitions were essential. The nearness of some of the mains to the rails, would naturally interfere with getting to them; and, apart from any question of concrete, the cost of repairs would be greater, because where lateral and vertical obstructions existed, men could not work with the same ease and rapidity. In the requisitions it had been asked that a duplicate pipe should be put on the other side of the road where the one was moved either to the north or to the south. This was necessary for the same reason—convenience of access—and also because it would enable the work in connection with communication-pipes to be done rapidly. If the mains were not duplicated in this way, the communication-pipes from the houses on the opposite side to the main would, of course, have to run right under the tramway. He agreed generally with Mr. Bryan's evidence.

In cross-examination, Mr. Danckwerts remarked that he supposed witness, in stating that delay and extra cost would be incurred in repairing the mains if they were under the tramway, assumed that the rails would be left in position while the work was carried out. Witness assented, and added that if it was put to him that the rails should be taken out while repairs were being executed, this would increase his objection tenfold, because, as a matter of fact, the rails were an enormous length—possibly 25 or 30 feet—and might weigh as much as 70 lbs. per yard.

The last witness called on behalf of the Water Company was Mr. E. M. Eaton, who said that, in the position of Water Engineer to the Corporation of Sheffield, he had had to deal with exactly the same question as had arisen in this case; the only difference being that the matter first cropped up there in connection with horse tramways. The proper thing, in his judgment, was to move mains and service-pipes away from the tram-rails, so that they could be easily got at. He agreed that, supposing a street were concreted right across, somewhat the same difficulty would be experienced whether there was a tramway there or not; but the presence of the rails would greatly increase the trouble of finding a leak, which was the chief objection to a road being concreted all over. The Company's requirements would not be in any way affected either one way or the other if a street was covered with concrete from side to side. In the interest of the consumers, it was most desirable that duplicate mains should be laid so that connections and repairs to the communication pipes could be carried out without touching the tramway system. As to the repairing of large iron pipes under the rails, there was, in addition to the question of time, a difficulty with regard to the efficiency of the work. To set up a joint on an iron pipe, a man must swing his hammer; and if the rail was just above him, he could not do this properly. With regard to the lateral deviation, the double service-pipes, and the moving of the valves he most emphatically agreed with Mr. Bryan.

The Gas Company's Case.

Mr. E. Moon, K.C. (with whom appeared Mr. R. B. D. Acland), then proceeded to open the case for the West Ham Gas Company, which he said was practically on all fours with that of the East London Water Company, though there were one or two minor differences. Unlike the supplying of water, there were along the proposed tramway route a large number of houses which did not at present take gas; but with the introduction of the prepayment system, there was no doubt that they would do so. It became, therefore, more important that no impediment should be placed in the way of these houses receiving a supply of gas. Then in the case of a gas service there must be a fall from the consumers' premises to the main, in order to obtain the requisite pressure. The Gas Company's requisition was similar to that of the Water Company. They asked that the mains might be moved laterally; and, in certain cases, that there might be a main down each side of the street, where a movement was made—that was to say, they wished the existing main to be moved outside the tramway on one side of the street, and, where there were houses to be supplied, a 4, 5, or 6 inch main to be laid down the other side.

He then called Mr. John Clark, the Engineer and General Manager to the Company, who said that there were about 7 miles of mains in the streets where the tramway was proposed to be laid. The sizes varied from 4 inches to 18 inches; and there were about 1450 service-pipes from them. Along the route, there were nearly 600 houses not yet supplied with gas; and he anticipated that many of these would come on, owing to the facilities offered by the prepayment meter. Then there was land not yet built on, which the Company reckoned would bring the possible number of new connections on the tramway route to about 750. A long service-pipe was in itself an objectionable thing; and if a tramway intervened, it would be still more so. The Company only asked for an additional main where there were either houses to be supplied or expected to be supplied on both sides of the street. This had been done by the East Ham Council, with whom the Company came to terms when they laid their trams down; and the plan worked very well there. He did not know the exact position of many of the mains, because before 1895, when he took charge, no map was left; but the Company asked for an award which would only operate where the mains would have to be disturbed. In the construction of the tramways, some of the mains and services had already been covered up without consulting the Company at all. Several of these were in a very dangerous position, within from 2 to 3½ inches of the underside of the metal rails on top of the concrete; and a tramcar passing over them, he should say, was distinctly unsafe. The engineer of the tramways did give the Company notice before commencing the work, and asked them if they would remove the mains—saying their contractor would do it. Witness was, however, advised that at that stage of the proceedings he had better not have them interfered with. Another difference between his case and that of the Water Company was that the gas service-pipes were iron, while the water-pipes were lead. It was necessary that there should be a fall from the houses to the main, to allow of the condensation running back into the latter. If the mains were put lower, but still under the tramway, it would be very expensive to get at them, and there would be a certain amount of danger to the men working. The cost of laying services under such conditions would, he reckoned, be about three times as much as at present.

In cross examination, witness said that, of the estimated cost of about £6000 for the complete scheme, the Company had asked the

Corporation for £3000, and for some help in the trenches. The Company would pay their £3000 towards the cost, in view of the convenience to them of the duplicating of the main. The Corporation were quite at liberty to do the work themselves; the Company did not want to make anything out of it. A leakage might be found sooner where there was a tramway than in an arched road of concrete without tram-rails, because where there was a heavy weight a fissure might be caused, through which the gas would get more easily than anywhere else. The anticipated increase in the number of services in consequence of the introduction of the prepayment system would not justify the Company in duplicating the mains in the streets referred to solely for their own convenience.

Mr. Corbet Woodall said that, in his opinion, the execution of the proposed work by the Corporation would in a great many instances injuriously affect the pipes and mains and connections of the Company. It had been made pretty clear that, where the pipes were underneath the rails, access would be far more difficult; and it would, he thought, also be most dangerous to the men who were working. Suppose they were searching for an escape, and found it—the gas coming out freely while the work of the tramway was going on overhead. The dropping of a match or the sparking of the current itself might ignite the gas, and the danger would be considerable, especially to men working in the trench. Then, again, if the trench opened were along the line of the tramway, it went without saying that the chance of a breakdown of the tram-rail itself, assuming the traffic to be going on, would be considerable. He could not, for his own part, conceive the mains being allowed to continue under the tramways in the direction of them—that was to say, not across, but along the line of them. Where the pipes were under the line of tramway, they should certainly be moved laterally, so as to be outside it; and if they were within 2 feet of the outer rail, they should be taken outside a 2 feet margin. When there was no pipe on the farther side of the road, it would be advisable to lay a second service-main, in order to avoid crossing the tramway in the future. Leakages from the main would, of course, be rendered more difficult to trace by reason of the concrete covering over the road; and if the surface of the road was made gas-tight, there was danger of the gas being forced into the houses, as it would find the first open place it could, and so would be likely to follow the service-pipe.

Cross-examined, witness said that he did not contend that putting pipes under concrete increased the danger of breakage; but that, granted the breakage, the presence of the concrete made it much more difficult to repair. It was, of course, only a question of extra cost in laying mains in a concreted road; the trouble and danger arose when there were fixed lines crossing the trench in which the men were working. There was nothing like the difficulty in repairing mains under concrete streets to what there was when they were under a tram-line.

This closed the case for the Gas Company.

(To be concluded.)

STRANGE CASE OF SUFFOCATION BY COAL GAS.

An inquiry was held at Westminster last Tuesday, by Mr. John Troutbeck, in regard to the death of Mary Elizabeth Parr, 34, wife of a cycle company's manager, lately residing at 29, Chelsea Gardens, who was found dead under very remarkable circumstances. Arthur Parr, the husband, stated that he last saw his wife alive the previous Saturday morning, when she seemed very cheerful; and he left home to go on a cycling tour. When he returned on Sunday night he found she was dead. They had been married about 15 years, and had lived quite happily down to four months ago, when he expostulated with her for drinking to excess, and she did not like it. She attempted suicide some nine years since by taking poison, but she had not lately spoken of taking her life. Miss Edith Carr, a governess, said she had known Mrs. Parr intimately, and had noticed her habit of taking too much stimulant. The deceased arranged to go with her to a theatre on Saturday evening, promising to meet her at Charing Cross. As she did not keep the appointment, witness went to her house, but was unable to gain admittance. She went again on Sunday evening, and got a constable to enter the bedroom. She then saw her friend lying dead, with many yards of gas tubing coiled round her neck, and her face under the bed-clothes; the other end of the tubing being connected with the gas-bracket. About a week before her death, the deceased had had a tooth extracted under gas, and she had done nothing but talk about the delightful sensation ever since. Witness thought it not at all unlikely that deceased fancied coal gas would give her a similar sensation. When she was found, the window was shut, the blinds drawn, and every aperture had been blocked up; and the room was full of gas. Dr. Freyberger, who made an autopsy, said death was due to suffocation by carbon monoxide gas poisoning. The Coroner said that, although it was rather too far fetched to suppose that the deceased made a genuine mistake in the quality and effect of the two gases, yet it was quite possible that having a tooth drawn under gas was a new sensation to her; and if the Jury thought there was any reasonable doubt in the matter, they ought to give effect to it in their verdict. The jury, after some deliberation, found that the deceased died from suffocation by coal gas, but the motive they left an open question.

Dublin Asylum Water Supply.—The present water supply provided for the extension Asylum at Portrane, built as an offshoot of the Richmond Lunatic Asylum, Dublin, having proved insufficient, owing to the constantly increasing number of inmates, the Joint Committee of Management have determined on embarking on further expenditure for new works, which will include the construction of a storage reservoir at Tonlegee, about 10 miles from Dublin, with accessories, the supply and erection of a cast-iron outlet tower and approach gangway of steel, with eduction and scour pipes, valves, &c., waste weir, and channel.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 385.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Invest-ment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Apl. 14	10½	Alliance & Dublin 10 p.c.	19½–20½	..	5 2 5
100,000	10	,,	7½	Do. 7 p.c.	13—14	..	5 7 2
200,000	5	May 12	6½	Bombay, Ltd. . . .	6–6¼	..	5 4 0
140,000	5	,,	6½	Do. New, £4 paid	4⅞–5⅛	..	4 18 11
380,000	Stk.	Feb. 25	12	Brentford Consolidated	242—247	..	4 17 2
300,000	,,	,,	9	Do. New . . .	182—187	..	4 16 3
50,000	,,	,,	5	Do. 5 p.c. Pref. .	127—132	..	3 15 9
206,250	,,	June 10	4	Do. 4 p.c. Deb. .	102—105	..	3 16 2
220,000	Stk.	Mar. 10	10⅝	Brighton & Hove Orig.	212—217	..	4 19 1
246,320	,,	,,	7⅝	Do. A. Ord. Stk. .	150—155	..	5 0 0
460,000	20	Apl. 14	10	British.	39—40	..	5 0 0
100,000	Stk.	Feb. 25	6	Bromley, Ord. 5 p.c. .	116—120	..	5 0 0
165,700	,,	,,	4½	Do. do. 3½ p c. .	90—95	..	4 14 9
500,000	10	May 12	7	Buenos Ayres (New) Ltd	10⅞–11¼	..	6 4 5
250,000	Stk.	June 29	4	Do. 4 p.c. Deb.	92—94	..	4 5 1
150,000	20	July 14	8½	Cagliari, Ltd. . . .	21—23	..	7 3 6
100,000	10	May 27	10	Cape Town & Dis., Ltd.	14—15	..	6 13 4
50,000	50	May 3	6	Do. 6 p.c. 1st Mort.	51—53	..	5 13 2
1,375,000	Stk.	Feb. 25	5⅝	Commercial 4 p.c. Stk.	110—114	..	4 11 3
536,485	,,	,,	5	Do. 3½ p.c. do.	106—109	..	4 11 9
442,947	,,	June 10	3	Do. 3 p.c. Deb. do.	85—87	..	3 9 0
800,000	Stk.	June 10	7	Continental Union, Ltd.	105—110	–5	6 7 3
200,000	,,	,,	7	Do. 7 p.c. Pref.	142—147	..	4 15 3
575,000	Stk.	Feb. 25	5½	Crystal Palace Ord. 5 p.c.	118—123	..	4 6 8
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120—125	..	4 0 0
112,533	,,	July 14	5	Do. 5 p.c. Deb. Stk.	133—138	..	3 12 6
486,090	10	July 14	11	European, Ltd. . . .	19—20	..	5 10 0
354,060	10	,,	11	Do. £7 10s. paid	13—14	..	5 17 10
15,243,200	Stk.	Feb. 11	4⅛	Gas-light and Coke { 4 p.c. Ord. . .	95—97	+1	4 10 8
2,600,000	,,	,,	3½	{ 3½ p.c. max. .	88—90	..	3 17 9
3,799,735	,,	,,	4	{ 4 p.c. Con. Pref.	108—111	..	3 12 1
4,193,975	,,	June 29	3	{ 3 p.c. Con. Deb.	87—89	–1	3 7 5
258,740	Stk.	Mar. 10	5	Hastings & St. L. 3½ p.c.	92—97	+2	5 3 1
70,000	10	Apl. 28	11	Hongkong & China, Ltd.	15—16	..	6 17 6
3,800,000	Stk.	May 12	10	Imperial Continental .	202—205	..	4 17 7
473,600	Stk.	Feb. 11	3½	Do. 3½ p.c. Deb. Red.	97—99	..	3 10 8
165,242	Stk.	Mar. 10	6	Lea Bridge Ord. 5 p.c.	113—118	..	5 1 8
561,000	Stk.	Feb. 25	10	Liverpool United A .	217—218	..	4 11 9
718,100	,,	,,	7	Do. do. B .	162—164	..	4 5 4
306,083	,,	June 29	4	Do. do. Deb. Stk.	106—108	..	3 14 1
75,000	5	June 29	5	Malta & Medn., Ltd. .	4¼–4¾	..	5 3
560,000	100	Apl. 5	5	Met. of { 5 p.c. Deb.	102—105	..	4 15 3
250,000	100	,,	4½	Melbourne { 4½ p.c. Deb.	103—102	..	4 8 3
541,920	20	May 27	3½	Monte Video, Ltd. . .	9—10	..	7 0 0
1,515,892	Stk.	July 29	4½	Newc'tle & G'tesh'd Con.	104—105*	..	4 5 9
405,025	Stk.	July 1	3½	Do. 3½ p.c. Deb.	92—92½	+1	3 15 8
300,000	Stk.	May 12	8	Oriental, Ltd. . . .	138—143	..	5 11 11
600,000	5	Mar. 29	7	Ottoman, Ltd. . . .	5⅞—6⅛	..	5 12 0

*Ex div.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Invest-ment.
£			p.c.	GAS COMPANIES.			£ s. d.
235,005	Stk.	—	6¾	Ply'mth & St'house 5 p.c	—	..	—
851,070	10	Apl. 28	7	River Plate Ord. . .	10⅜–11½	..	6 4 5
300,000	Stk.	June 29	4	Do. 4 p.c. Deb..	93—95	..	4 4 3
250,000	10	Mar. 29	7	San Paulo, Ltd.. . .	11—12	+½	5 16 8
135,000	Stk.	Mar. 10	10	Sheffield A	237—239	..	4 3 8
209,984	,,	,,	10	Do. B	236—238	..	4 4 0
523,498	,,	,,	10	Do. C	234—236	..	4 4 9
116,106	Stk.	—	5	Shrewsbury Ord. 5 p.c.	—	..	4 10 11
6,250,000	Stk.	Feb. 11	5⅜	South Met., 4 p.c. Ord.	126—128	+1	4 3 3
1,832 700	,,	July 14	3	Do. 3 p.c. Deb. . .	87—89	..	3 7 5
380,940	Stk.	May 12	5	Southampton Ord. . .	105—110	..	4 10 11
87,950	,,	—	4	Do. 4 p.c. Deb.	—	..	—
120,000	Stk.	Feb. 25	6	Tottenham and Edmonton { A. 5 p.c.	123—125	..	4 16 0
313,020	,,	,,	4⅜	{ B. 3⅜ p.c.	97—102	..	4 8 3
182,380	10	June 10	8	Tuscan, Ltd.. . . .	£⅞–8⅜	..	9 2 10
149,000	10	July 1	5	Do. 5 p.c. Deb. Red.	96—98	..	5 2 0
745,872	Stk.	Mar. 10	5	West Ham, 5 p.c. Ord.	97—102	..	4 18 0
				WATER COMPANIES.			
782,322	Stk.	June 29	12	Chelsea, Ord. . .	360—370	..	3 4 10
150,000	,,	,,	5	Do. 5 p.c. Pref. .	157—.62	..	3 1 9
160,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	142—147	..	3 1 3
175,785	,,	Mar. 29	4½	Do. 4½ p.c. Deb. .	137—142	..	3 3 5
1,720,560	Stk.	Mar. 29	8	East London, Ord.. .	223—228	–2	3 10 2
654,740	,,	June 29	4½	Do. 4½ p.c. Deb. .	135—140	..	3 4 4
1,524,283	,,	,,	3	Do. 3 p.c. Deb. .	90—92	–1⅛	3 5 3
700,000	50	June 10	12	Grand Junction { 10 p.c. max..	135—140	–2	4 5 9
310,000	Stk.	Mar. 29	4	{ 4 p.c. Deb..	122—126	..	3 3 6
708,000	Stk.	Feb. 25	10	Kent	325—335	..	2 19 8
160,000	,,	,,	7	Do. New, 7 p.c. max..	230—240	..	2 18 4
1,043,800	100	June 29	11	Lambeth, 10 p.c. max..	315—325	..	3 7 8
426,200	100	,,	8½	Do. 7½ p.c. max..	230—240	..	3 10 10
350,000	Stk.	Mar. 29	4	Do. 4 p.c. Deb..	120—125	..	3 4 0
500,000	100	Feb. 25	10	New River, New Shares	310—330	..	3 0 0
1,000,000	Stk.	July 28	4	Do. 4 p.c. Deb..	123—124†	..	3 4 7
902,300	Stk.	June 29	7½	South-wark { Ord. . . .	280—285	..	2 12 6
126,500	100	,,	7½	{ 7½ p.c. max.	215—225	..	3 6 7
489,200	Stk.	,,	5	and { 5 p.c. Pref..	145—150	..	3 6 8
1,019,585	,,	Mar 29	4	Vauxhall { 4 p.c. A Deb.	120—125	..	3 4 8
1,155,066	Stk.	May 27	10	West Middlesex . . .	300—305	..	3 5 7
200,000	,,	June 10	4½	Do. 4½ p.c. Deb. .	137—142	..	3 3 5
200,000	,,	Mar. 10	3	Do. 3 p.c. Deb. .	91—94	..	3 3 10

† Ex div.

GAS COAL CONTRACTS AT ROTHERHAM.

The subject of the gas coal contracts for the current year gave rise to a rather heated discussion at the quarterly meeting of the Rotherham County Borough Council last Wednesday. In the minutes presented by the Gas Committee, they stated that a Sub-Committee who had had under consideration the tenders submitted for gas coal had reported thereon, and recommended the acceptance of the following: Greasbro' Coal Company, 3000 tons, at 9s. per ton (screened); Messrs. J. & G. Wells, 4000 tons, at 9s. per ton (large nuts washed); Dalton Main Colliery Company, 2000 tons, at 8s. per ton (large nuts); Rother Vale Colliery Company, 5000 tons, at 8s. 11d. per ton (small nuts washed); Eveson Coal Company, 2000 tons, at 9s. per ton (large nuts); Messrs. J. Longham and Son, Hickleton, 2000 tons, at 8s. per ton (pea nuts); Sheffield Coal Company, 3000 tons, at 9s. per ton (large nuts); and Mitchell Main Colliery Company, 1000 tons, at 8s. 8d. per ton (large nuts). The Committee recommended the adoption of the report of the Sub-Committee.

The adoption of the Committee's recommendation was moved by Alderman Gummer, who read a letter he had received from Messrs. John Brown and Co., Limited, expressing their regret that, after having had the privilege of serving the Corporation for a long period, their names were not included in the list of firms whose tenders had been recommended for acceptance. The Mayor (Mr. G. Clarke) having seconded the motion, Mr. Bryant said he had expected that the Chairman of the Committee would have given the Council some information as to why two particular Companies (Messrs. John Brown and Co., Limited, and Messrs. Newton, Chambers, and Co., Limited), who had customarily had the principal portion of the contract, had not been included this year. Mr. Grundy wished to know the results of the tests of the coal of the Eveson Coal Company. Alderman Gummer said it was not usual to give reasons why tenders were not accepted. However, he had no objection to answering Mr. Bryant's question. The reason they did not accept Messrs. John Brown and Co.'s tender was that the price was too high—10s. 6d. per ton for screened coal. With regard to Messrs. Newton, Chambers, and Co., Limited, the same conditions applied—the prices not being near those of other people. Both tenders were declined. With regard to the coal of the Eveson Company, the Committee were assured, on the authority of the Gas Engineer (Mr. Frank A. Winstanley), and by people who were in a position to know, that their coal was of a very high quality indeed for gas-making purposes. In order to protect themselves, the Committee would only accept the tender subject to tests being satisfactory.

A long discussion ensued, in the course of which Alderman Woodhouse pointed out that Messrs. Brown and Co. had never, during the past 28 years, missed supplying a large quantity of coal for the gas-works. The prices of the tenders this year—10s. 6d. for screened and 9s. 6d. for unscreened coal—were something like 1s. 6d. per ton less than last year. He had always supported contracts being placed in the town; and he should do so in this case, for he considered that the local coal had the advantage in commercial value. Mr. Bryant moved, as an amendment, that the whole of the recommendations should be referred back, arguing that no tests had been submitted of Messrs. Brown's coal. Alderman Gummer said they had been making tests for the last 28 years, and he saw no reason for having special ones. There was a limit to the testing capacity of the gas-works, and they could not go on testing for ever. The Mitchell Main coal had not been tested. Mr. Grundy said he would second the amendment, especially after the statement of Alderman Gummer as to the acceptance of the tender of the Mitchells Main Colliery Company for 1000 tons of coal when no tests had been made. The matter had only been before a Sub-Committee. Mr. Jenkins thought the Council had made a mistake in not having dealt with the whole question in Committee. It looked as if a Sub-Committee had been appointed to deal with the subject, and the bulk of the Council had no confidence in them. He would support the recommendation of the Committee, who had no doubt gone carefully into the matter. The amendment was lost by 12 votes to 4; there being 5 neutral members.

Alderman Woodhouse then proposed a further amendment in favour of the Dalton Main Colliery Company's tender, at 8s. per ton, being substituted for that of the Sheffield Coal Company at 9s. per ton. Mr. Reeves seconded the amendment. Alderman Gummer opposed the amendment, and replied to the arguments of several speakers to the effect that more work would be found for the miners of Rotherham if the amendment were passed. He pointed out that 3000 tons of coal at a large pit could not possibly mean three or four days per week more work for the men, as had been stated. He went on to say that the Corporation had for years been paying more than the market price for their gas coal. The tenders had hitherto been limited in number; whereas this year they had 33. The amendment was lost, as was also one moved by Mr. Grundy, the object of which was to give to the Dalton Main Colliery Company the 3000 tons recommended to be given to the Eveson and Mitchell Main Companies. The Committee's recommendation was then adopted.

RICHMOND (SURREY) WATER SUPPLY.

Transfer from the Metropolitan Water Board—Recognition of Officials' Services.

At the Meeting of the Richmond (Surrey) Town Council last Tuesday, the Water Committee reported that they had received a letter, dated the 16th ult., from Mr. Joseph Quick, reporting that the work connected with severing the mains and providing and fixing the water-meters in accordance with the award of Sir Alexander Binnie and himself, on the transfer of the supply of the borough from the Metropolitan Water Board to the Corporation, was being proceeded with as quickly

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as possible. The Committee went on to say that, although they had from time to time, as far as possible, reported to the Council the various steps taken by them in connection with the transfer, the difficulties they had encountered, and the important results of the protracted business, they considered that a short *résumé* of the details would not only be acceptable to the members of the Council, but of considerable value for subsequent reference, having regard to any revision of price or other matters relating to the water supply to the borough which might be required in the future. They therefore asked the Chairman and Town Clerk to prepare it; and it accompanied the report. The Chairman had suggested that as the work of the Committee and their officers in respect of the acquisition by the Corporation of the complete water supply of the borough had now been successfully accomplished, the time had arrived to recommend the Council to recognize the special services rendered by Mr. Senior (the Town Clerk), Mr. Peirce (the Water-Works Engineer), and Mr. Richards (the Borough Accountant) in the matter; and the Committee unanimously recommended the Council to grant to the Town Clerk an honorarium of 100 guineas, to the Water Engineer one of 50 guineas, and to the Borough Accountant one of 25 guineas. Alderman Roberts (the Chairman of the Committee) said no man had done more work in this matter, and done it more successfully, than Mr. Senior, as he had saved them perhaps many thousands of pounds. Their old official, Mr. Peirce, had been in constant consultation with Mr. Quick, and had given great assistance; while Mr. Richards, by going through the figures submitted by the Water Board, had enabled the Council to make such an offer as had brought the price down from £50,000 to £35,000. The work performed by these officials was not incidental to their ordinary duties, but was quite new; and had they not done it so cheerfully and well, someone else must have done it. He therefore moved the recommendations with regard to the honorariums. He said the Council should be deeply grateful to these gentlemen. If they were to be paid the real worth of their time, they would be paid five or six times the amount recommended. Mr. Heasler seconded the motion, and it was carried. Mr. Senior thanked the Council on behalf of himself and his fellow-officials. He also expressed his thanks to Alderman Roberts, Mr. Quick, and Mr. Coward, K.C.

The services of the Chairman of the Water Committee were also recognized in the following resolution, which was moved by the Mayor (Alderman Clifford B. Edgar): "That the best thanks of this Council be and are hereby accorded to Alderman Stephen Roberts, J.P., S.C.C., for the very valuable services to the borough which he has rendered as Chairman of the Water Committee during the negotiations with the Metropolitan Water Board, by which the Council has acquired the right of water supply in the parishes of Kew, North Sheen, and Petersham." He referred to the great tact and judgment which had been necessary to carry this important business through; and said he thought they should put on record their sense of obligation to the Chairman of the Water Committee who had had to give it his consideration, both in and out of season, for many months past, and had been occasioned no little anxiety in connection with it. The motion was carried, as was one thanking Alderman Burt for his services. Both gentlemen returned thanks; the latter remarking that he felt a tinge of regret that the spirit of justice and equity with which the Water Board had met Richmond had not been acknowledged in the report. He thought the agreement perfectly fair on the part of the Board, and very satisfactory as regarded Richmond. The Mayor thought the Council might place on record their sense of the fair and equitable spirit in which the Board had met them. A resolution to this effect was approved, including a reference to the Board's officials.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Corporation of Falkirk held a special meeting last night, upon the subject of the agreement with the North British Railway Company as to providing railway facilities for the new gas-works to be built at Thornhill. Mr. H. Russell, the Convener of the Special Committee, said that they had had meetings with all the parties interested and that they were now able to lay the agreement before the members. He trusted it would be unanimously adopted by them. If the agreement were carried out, it would not only result in a great saving and convenience to the Council, but would be a great saving and convenience to traders in the district. The agreement is to the effect that the North British Railway Company are to use due diligence in endeavouring to acquire land for the formation of a railway; but if they do not succeed in the course of six months, the agreement shall, at the option of either party, become void. It was explained that, in the event of the Railway Company failing, the Town Council have an agreement with an owner of land, upon which they can proceed with the formation of a private railway. The Council unanimously approved of the agreement. Mr. Russell then said that they had had contracts for the new gas-works accepted conditionally for some months. They could now take the necessary steps to have the contracts accepted and the work proceeded with. Considering that it has taken more than seven years to reach this point, there is room for expressing gratification that at last something has been done, and the hope that matters will now go on smoothly.

It was intimated at a meeting of Helensburgh Town Council last night that the surplus on the Corporation gas undertaking for the past year, in addition to paying £372 for enlarged mains, amounted to £531. This sum has been earned notwithstanding that there was a reduction in the price of gas to the amount of 5d. per 1000 cubic feet.

At the annual meeting of the Saltcoats Gas Company, Limited—whose affairs are so well managed by Mr. J. Napier Myers—it was reported that the balance at the credit of the profit and loss account for

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Works: LONDON AND EXETER.

the year ending May 31 amounted to £1376. A dividend at the rate of 7½ per cent.—an increase from 6¼ per cent.—was declared, and £176 was carried forward. The revenue from the sale of gas and residuals showed a satisfactory increase; but the price of tar and liquor for the current year has fallen considerably. It has been resolved to make a charge of 2s. a year for meter hire upon all consumers registering less than 5000 cubic feet in the twelve months. During the year, a new washer scrubber has been erected, large additions and alterations have been made to the retort-bench, and new mains have been laid. The revenue from the sale of gas was £3865, from tar and liquor £442, and from coke £399. The quantity of gas made was 24,882,600 cubic feet, and the unaccounted-for gas amounted to 5·2 per cent. The yield of gas was 10,676 cubic feet per ton of coal. Since the Company was incorporated five years ago, the number of consumers has increased from 1929 to 2205, the number of consumers using prepayment meters from 55 to 90, the number of grillers on hire from 83 to 155, and the number of public lamps from 196 to 211. Depreciation was allowed out of revenue to the amount of £465. The average cost of coal and cartage was 13s. 2·28d. per ton, or 1s. 2·83d. per 1000 cubic feet.

At the last meeting of the Gas and Electric Lighting Committee of the Aberdeen Town Council, application was made by the County Council of Aberdeen for a supply of gas for the public lighting of the Waterton special lighting district—a district to the north of the city, where there are large paper mills. The Committee agreed that a supply be granted at the same rate as was charged to the Woodside district before it was included in the municipal area.

It is reported from Forfar that the past year's working having proved satisfactory, it is proposed to reduce the price of gas from 3s. 9d. to 3s. 4d. per 1000 cubic feet.

This week, at a meeting of the Dunfermline District Committee of the Fife County Council, a letter was read asking that consideration of a proposal to form the district of Kelty into a special lighting area be delayed, as negotiations are in progress for the formation of a Gas Company there. Mr. Charles Carlow, the Managing-Director of the Fife Coal Company, wrote that substantial help would be given to Kelty in the event of their not finding the offer of the Cowdenbeath Gas Company to be satisfactory. After some discussion, the Committee agreed to the request to delay the matter.

The accounts of the Glasgow Corporation Electricity Department for the year ending May 31, show a gross revenue of £158,190, and a working expenditure of £61,738. Out of the balance, the Electricity Committee had to meet statutory requirements, as follows: Interest on loans £36,023, and sinking fund £15,205—together, £51,228; leaving £46,222 From this the Committee have voted £3700 as a proportion of the cost of lamps and fittings supplied to consumers consequent on the charge of voltage. This reduces the balance of revenue to £42,522. The Committee have resolved to write off the capital account, in the name of depreciation for the twelve months, at the same rate as in the previous year—a sum of £32,180. When this is done, there is a surplus on the year's working of £10,341; but inasmuch as the Committee have repaid to the Gas Committee the amount of £13,895, which was the amount of deficit for the previous year, made up by the Gas Committee, there is a debit balance on the year's working of £3554. This entry the Committee advise should be carried forward. During the year there was a capital expenditure of £109,482; and the whole capital outlay, since the starting of the department in 1892, has amounted to £1,118,047.

At the risk of its being said that too much is being made of a small matter, I must revert to the dispute between the Carnoustie Town Council and the Carnoustie Gaslight Company regarding the Company's charge for gas for public lighting. I stated recently that the Town Council had rejected the offer of the Company to take £160 to settle the matter, and had resolved to send a cheque for £150. The Directors of the Company refused to accept £150, and they sent notice to the Council that the £160 must be paid within ten days. The financial year of the Company is about to close, and a prompt settlement was asked. In a former communication, the Company intimated that non-compliance with their demand would probably lead to litigation. Without going into the merits of the dispute, it may be pointed out that this incident shows that it is not always good policy on the part of a Company to be too complaisant. It is all very well to be good-neighbourly—and the Company have been so to a high degree. But with some this is a quality which is not appreciated. The lesson to be drawn from this affair is that the best policy is to be careful of the first charge, and, having made it, to stick to it. The dispute has been settled this week by the Lighting Committee agreeing to pay the £160 originally demanded by the Company.

Last week the Corporation of Aberdeen paid a visit to the district of the River Avon, from which they propose to take a supplementary water supply for the city. They were there two or three years ago, and satisfied themselves as to the suitability of the supply, in point of quality and abundance; but when they consulted Mr. Charles Hawksley, of London, upon the best source whence to obtain an augmented water supply, he passed over the Avon scheme, and wrote approvingly of the Corporation continuing to take their water supply from the River Dee, but at a point higher up the stream, so as to get rid of the pollution from the town of Ballater and other populous places. There is a large section of the Town Council, however, who still have a warm regard for the Avon as the source of supply; and this year's visit, which took the place of the annual inspection of the waterworks, was organized with the view of making new members of the Council acquainted with what is proposed. The visit took the party into the mountainous regions of the Cairngorm range. It lasted for three days. The estimated cost of the Avon scheme is £1,000,000, and of that of Mr. Hawksley £700,000.

The York United Gas Company have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for a 2 million cubic feet per day Livesey washer.

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WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	STRETFORD	500,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	OLDBURY	300,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	TODMORDEN	500,000
BIRKENHEAD	2,250,000	ST. CATHERINES (2nd Cont)	250,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	YORK (Second Contract)	750,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	ROCHESTER (Second Contract)	500,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	NEWPORT (MON.)	250,000
HALIFAX	1,000,000	YORK	750,000	TOKIO, JAPAN	1,000,000
TORONTO	250,000	ROCHESTER	500,000	PERNAMBUCO (Brazil)	125,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	MALTON	150,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	DULUTH, MINN. (2nd Cont)	300,000
MONTREAL	500,000	DULUTH, MINN.	300,000	BROCKVILLE (ONT.)	250,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	SMETHWICK	500,000
BELLEVILLE	250,000	LEICESTER	2,000,000	GRAVESEND	300,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	NEWPORT MON. (Second Contract)	250,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	TORONTO (Third Contract)	750,000
		BURNLEY	1,500,000	TORONTO (Fourth Contract)	1,000,000
		KINGSTON-ON-THAMES	1,750,000	MONTREAL, ONT. (2nd Cont.)	1,800,000
		ACCRINGTON	500,000	HAMILTON, ONT.	400,000

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CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Aug.* 6.

Sulphate of Ammonia.

There has been no special feature in the market upon which to comment; the tone being quiet and prices barely maintained. Hitherto the large makers have been very firm; but they now show a disposition to meet the market, and this attitude is lending encouragement to buyers to continue their efforts in the direction of lower prices. The closing quotations are £11 13s. 9d. per ton f.o.b. Hull, and £11 15s. to £11 16s. 3d. per ton f.o.b. Liverpool and Leith. For the near months, speculators are still quoting the equivalents of spot prices abroad with some amount of success. Further ahead, however, they are less venturesome, and there has consequently not been much done. Makers' prices practically preclude business.

Nitrate of Soda.

This article is quieter in the forward position, but without material change in values. Spot prices are firm at 10s. to 10s. 3d. per cwt., according to quality.

LONDON, *Aug.* 5.

Tar Products.

There is very little business to report, markets being very quiet all round. In pitch, the weakness in the Lancashire district still continues; makers appearing very anxious to sell for delivery up to the end of the present year, but consumers hold off the market, believing that still lower prices must be accepted. Considerable business appears to have been done in Yorkshire pitch for forward delivery at 30s. per ton; but so far as London is concerned, the largest makers do not seem prepared to meet the market, and they are still firm in their ideas. Dealers, however, continue to quote very low prices both in Belgium and South Wales, with the effect that consumers hold off the market. Being evidently well supplied for some time to come, they intend waiting until what, in their opinion, is actually the lowest price has been reached. Stocks are not large; but the fuel trade does not appear to be very brisk at present, especially in France, where a falling off in the production is reported. Further business is reported in 90 per cent. benzol at 9d. per gallon; but 50-90 per cent. appears neglected, and consumers do not take any interest in same. The position of anthracene remains unchanged. There are still rumours of a large business being negotiated for delivery all over next year; but it is difficult to obtain particulars of same. Consumers would, however, be quite willing to pay 2d. per unit for good "A" qualities; but none of the large makers will entertain this figure at present. So far as home consumption is concerned, there is a decidedly better demand for solvent naphtha, especially in the London district; but for export there does not appear to be any inquiry. No business seems to be taking place in crude carbolic acid, as consumers now only offer 1s. 10d., and in some instances speak of even lower prices. Makers, however, are fairly well sold for early delivery, and do not seem prepared to anticipate a further fall, believing that a revival will take place in the winter months, when 2s., should again be obtainable. In crystals, there is no business whatever to report; and prices are purely nominal. There is still a large business doing in the North in creosote at $1\frac{3}{8}$d. to $1\frac{7}{16}$d.; and makers appear firm in their ideas. London makers have also advanced their prices, and in some instances ask $1\frac{3}{4}$d., as there seems to be a fairly good demand all round, and prices are likely to be well maintained for some time to come.

The average values during the week were: Tar, 17s. to 21s. 6d. Pitch, London, 30s. to 30s. 6d.; east coast, 30s.; west coast, 26s. to 26s. 6d. Benzol, 90 per cent., 9d.; 50-90 per cent., 7d. Toluol, $6\frac{1}{2}$d. Crude naphtha, $2\frac{3}{4}$d. to 3d.; solvent naphtha, 7d. to $8\frac{1}{2}$d.; heavy naphtha, $9\frac{1}{2}$d. to 10d. Creosote, London, $1\frac{1}{2}$d. to $1\frac{9}{16}$d.; North, $1\frac{3}{8}$d. Heavy oils, $2\frac{1}{4}$d. Carbolic acid, 60 per cent., 1s. 10d. to 1s. $10\frac{1}{2}$d. Refined naphthalene, £5 to £8; salts, 21s. to 22s. 6d. Anthracene, "A" quality, $1\frac{3}{4}$d. to $1\frac{7}{8}$d.; "B" quality, 1d., nominal.

Sulphate of Ammonia.

The market is decidedly quiet; and there is an entire absence of business. Beckton are now sellers for £11 18s. 9d. for August-September delivery; but decline to quote further forward. South Metropolitan are sellers at £12, on their own special conditions; but there is no business at present doing even at this price. At Hull, there are sellers at £11 13s. 9d. for prompt; but buyers seem indifferent, and would not pay more than £11 12s. 6d. The actual quotation in Liverpool may be taken as £11 15s.; but there are no transactions to note even at this price. The market in Leith is very quiet; and there does not seem to be any business doing. The price is nominally £11 12s. 6d. to £12 15s.; but there are really no actual transactions to report.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The continued hot weather keeps the demand for house coals at zero, and tends to increase the stocks at the coal yards, wharves, and sidings. The short time which is still being worked at the pits curtails the the quantity of slack made; and for this the demand is about equal to the supply. So that full current rates are maintained, with a rather hardening tendency. The casting vote of Lord James, the Independent Chairman at the meeting of the Coal Conciliation Board for the federated districts of England and North Wales, on Wednesday, in favour of the 5 per cent. reduction in the wages of miners, will, no doubt be loyally observed, although the pill is an unpleasant one for the men to swallow. There is a crumb of comfort in his Lordship's "hope" that the Board would have to call in his services very shortly to fix the rise in wages. The result of the Board meeting has had no effect on the Coal Exchange; and prices for all descriptions remain unaltered.

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All the local municipal corporations have fixed their coal contracts for the ensuing year, at prices below those of last year—another indication of the glut in the coal market. The Cotton Mill Owners Federation have resolved to continue working short time a little longer. This resolve tends to preserve the present reduced consumption of engine coal. The Salford Corporation have accepted a contract for 15,000 tons of washed slack, at 7s. 8d. per ton, from the Clifton and Kersley Coal Company, and 5000 tons at the same price from Messrs. A. Knowles and Sons, Limited. The prices of contracts with other firms have not been made known.

Northern Coal Trade.

There has been a rather better demand for coal since the holidays. At some of the ports the shipments have been full; but the future of the trade seems to be a little open to question, as forward sales are fewer, and where there are orders some of the buyers seem to want slight concessions in price. Best Northumbrian steam coals are 10s. to 10s. 1½d. per ton f.o.b., second-class steams are 8s. 9d., and steam smalls are plentiful at from 3s. 9d. to 4s. In the gas coal trade, the demand begins to increase, and the deliveries to the chief gas companies are enlarging, as the low stocks of summer will now be replenished while the cost of the sea carriage is so small. Durham gas coals are quoted from about 7s. 10½d. to 8s. 3d. per ton f.o.b. for occasional cargoes; and the price for such small contracts as are being negotiated is between these figures, unless there is a very long period of delivery, when a lower price is offered. The possibility of some disputes in the Scotch coal trade may in a week or so influence the prices of coal here. Coke is steady, and prices for gas coke are still based on from 13s. 3d. to about 13s. 9d. per ton f.o.b. in the Tyne.

Scotch Coal Trade.

Trade shows no sign of improvement. Though there were large outputs, supplies continue to be more than ample. The prices quoted are: Main 7s. to 7s. 3d. per ton f.o.b. Glasgow, ell 8s. to 9s. 3d., and splint 8s. 3d. to 8s. 9d. The shipments for the week amounted to 216,092 tons—an increase of 63,062 tons upon the previous week, and of 23,014 tons upon the corresponding week of last year. For the year to date, the toal shipments have been 6,352,230 tons—an increase of 169,981 tons upon the same period of 1903.

Protection of Water-Works Land.—The arbitration for land sought to be obtained in the Isle of Wight by the Corporation of Ryde for the protection of their water-works has ended by the Arbitrator (Mr. J. E. Rawlence, of Salisbury) awarding Mr. Carter, the owner, the sum of £2655, with an additional £25 10s. per annum for restrictive land. Mr. Carter's claim had reached £6000; and the offer of the Corporation had been £2135, with £500, or an annual rental of £20, for the land to be controlled. The Corporation are to take possession in April next, and to fence against cattle, sheep, and rabbits.

Water Supply for Woodcote.—The new reservoir of the Thames Valley and Goring Water and Gas Company, Limited, which is now sufficiently near completion to admit of some water being pumped into it, was recently inaugurated, in the presence of the Chairman (Mr. H. J. Robus) and two Directors. Services are already laid on from the rising main, and when the reservoir can be filled the parish generally of Woodcote can take a supply of the Company's water.

Coal Workings under Water Reservoirs.—At the meeting of the Manchester Corporation on Wednesday last, the Chairman of the Water Committee (Sir John Harwood), in moving the confirmation of their minutes, said the Committee had been very anxious with regard to the reservoirs and works in the Audenshaw and Denton district. Coal mines working in the neighbourhood had caused the land to subside. The reservoirs had sunk, so that it had been necessary to reduce the holding capacity below the top water-level to an extent equal to 330 million gallons of water. The Corporation were in no way to blame for this. They were not aware, when they purchased the land, that any coal was intended to be worked under it, and to buy out the coal would be a very expensive matter. They were advised that they were entitled to the support of their land.

Water-Meters for Checking Waste.—The following testimony to the value of water-meters in checking waste where the capacity of the works has been reached has lately been furnished by Mr. C. E. Bolling, the Superintendent of the Richmond (Va.) Water Department: "Had we not adopted the meter system, Richmond would undoubtedly have experienced a water famine last winter, due to the constant stoppage of the water-power pumps from ice and the excessive waste in fixtures to prevent bursting of pipes. For comparison, in 1893, during a long cold spell, the average quantity pumped per day was 17 million gallons. Our reservoirs were nearly empty, and there was little or no pressure along some of our principal streets. During the past long cold season, the daily pumpage was 14 million gallons, there was at no time a scarcity of water in the reservoirs, and the pressure on the mains was ten times greater than in 1893."

Holderness Water Supply.—At a recent meeting of the Sculcoates Rural District Council, a communication was read from the Local Government Board with respect to the water supply in the Holderness area. The letter was a copy of one sent to the Withernsea Urban District Council in response to a request for power to borrow £6720 for various purposes, including water-works. The Board stated that they had under consideration the whole question of water supply in the Holderness area, and it appeared to them that the position was serious and urgent. The Holderness area presented so many questions of unusual difficulty, and the need of an adequate supply was so widespread and pressing, that the Board had instructed Inspectors of the Medical and Engineering Departments to visit the district and make a thorough investigation of the circumstances. The Sculcoates Council, who are only concerned with the district of Preston, decided to acknowledge the receipt of the letter, and await the Inspectors' report.

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STRATFORD,
&c., &c.

Hot Weather!

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Advertisement of the Richmond Gas Stove and Meter Co., Ltd.

The Castletown Town Commissioners and the Water-Works.—The Castletown (Isle of Man) Water Company have been approached by the Town Commissioners with a view to the sale of their property. The Company have instructed Messrs. Thomas Newbigging and Son to value the undertaking on their behalf.

Reductions in Price.—The Bury Gas Company announce a reduction from 3s. 9d. to 3s. 6d. per 1000 cubic feet in the price of gas. In addition to the reduction of 1d. per 1000 cubic feet already decided upon by the Cardiff Gas Company, the Directors have made a further reduction of 3d. per 1000 cubic feet, making 4d. in all, to gas consumers in Llandaff, Ely, Whitchurch, Llanishen, and St. Fagan's, all of which districts will for the future be placed on an equality with consumers in the central districts, where gas is now being supplied at 2s. 9d. per 1000 cubic feet.

Hoylake and West Kirby Gas and Water Company, Limited.—The accounts for the year ending the 30th of June, which were presented at the ordinary general meeting of the Company on the 29th ult., showed that the net gas revenue was £2958, and the water revenue £4057; making together £7015. Adding the balance brought forward made a total of £7590. Deducting the interim dividend of £2045 paid in January, there was £5545 available for distribution. The Directors recommended dividends at the rate of 7, 5⅛, and 8 per cent. (six months) on the gas capital, amounting to £1543, and of 6, 4¾, and 7 per cent. (six months) on the water capital, amounting to £2125; making together £3668, and leaving £1877. Of this sum, £500 was transferred to the gas reserve fund, and £750 to the water reserve fund; making together £1250, and £627 was carried forward.

The Exeter Gas Company's Appeal.—At the last meeting of the St. Thomas Board of Guardians, the Chairman (Rev. F. F. Buckingham) referred to the appeal by the Exeter Gas Company against the assessment of their works and mains, and the decision of the Recorder reducing the valuation placed on the works by the Assessment Committee. He said the Company's was one of certain special properties the assessment of which, it was felt necessary to considerably increase; and, in a matter of this sort, they had to depend in great measure upon the opinion of their Valuer. They were fortified with the opinions of two other experts, and felt justified in going into Court. The Recorder adopted a figure which for St. Thomas and Heavitree was £200 below that at which the Assessment Committee placed the valuation. This, however, meant an increase on the original assessment; but as the Recorder had decided that the Committee should pay the Company's costs as well as their own, the benefit of the increased rateable value would not be felt for some years. Mr. Courtney thought the Committee had made a grievous mistake. If they had approached the Assessment Committee of Exeter and come to some arrangement with them, litigation might have been avoided. The Chairman replied that Mr. Courtney's criticism was discounted by the fact that he had previously urged them to adopt the highest figure as the valuation of the Company's works.

Rickmansworth District Council and the Gas-Works.—At their meeting last Thursday, the Rickmansworth District Council had before them the award of Sir George Livesey in the arbitration respecting the purchase of the gas-works, and a letter from the Ecclesiastical Commissioners stating that, if the Council wished to borrow the purchase-money from them, their rate of interest would be 4 per cent. The Secretary of the Gas Company (Mr. H. W. Fellows) also wrote suggesting that the transfer of the gas-works should take place on the 30th of September.

West Ham Gas Company.—The report and accounts to be submitted at the half-yearly meeting of the West Ham Gas Company today, show that the receipts for the six months to June amounted to £115,858, against £105,087 in the corresponding period of the previous year; the expenditure being £89,155, compared with £81,679. This left a balance of £26,703 to be carried to net revenue account. Out of the balance of £26,289 available for division, the Directors recommend that dividends for the six months at the rate of 5 per cent. per annum should be declared on the preference stock and upon the consolidated ordinary stock. These would amount to £20,772, and leave £5517 to be carried forward. The large holder now being erected at the branch works at East Ham is making good progress, and will, it is hoped, be ready for use next winter. The demand for prepayment supplies is still maintained, and is being met as rapidly as practicable. During the past six months, some 2300 additional installations were completed—the total in operation at June 30 being 8836, while over 4000 applications were in hand.

Manchester and the Salford Water Supply.—At the meeting of the Salford Town Council, on Wednesday, the Special Committee who have been negotiating with the Manchester Corporation with regard to the price and pressure of the water to be supplied to the township of Salford reported that the following terms had been agreed upon, subject to confirmation by the two Councils: "(1) The Manchester Corporation to supply to the township of Salford all the water required at the price of 4½d. per 1000 gallons. (2) The Manchester Corporation to construct a 24-inch main from the Denton Reservoir to Regent Road Bridge for the exclusive use of the Salford Corporation, at an estimated cost of £32,000, the Salford Corporation paying £26,000 towards the cost thereof. (3) The Salford Corporation to pay to the Manchester Corporation the sum of £250 per annum for the maintenance of the main. (4) That this arrangement shall cancel all previous arrangements between the two Corporations, and be embodied in a formal agreement." Alderman Snape, the Chairman of the Committee, moved the acceptance of these terms. He said he thought the Council were to be congratulated on the result of the negotiations, which had saved the cost of arbitration proceedings. They were to get a full and unlimited supply of good water at a moderate cost, and the pressure would be sufficient to force the water to the top of the highest building in the borough. No decision was come to on the matter; the Council being counted out.

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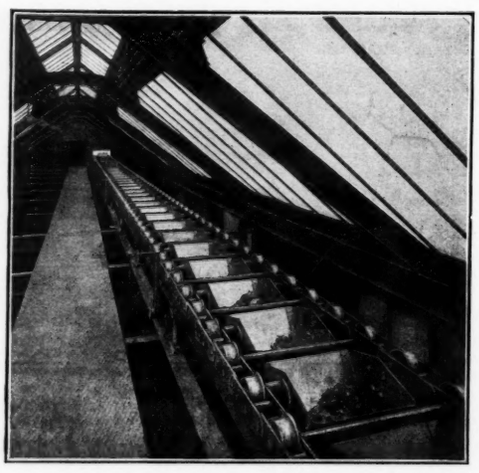

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Use of Water for Gardens at Torquay.—Considerable feeling was excited at Torquay by a recent order of the Corporation prohibiting the use of garden hoses, on the ground that the consumption of water through these appliances was so large as to endanger the supply for ordinary purposes. Many persons had paid in advance the charge for the use of a hose up till Michaelmas next; and they were especially indignant on being informed that the order applied to them as well as to those who had not paid. The course adopted by the Corporation appears, however, to have been justified by results. The consumption of water, which had reached the enormous quantity of 49 gallons per head per day, has fallen to 35 gallons; and the necessity for a new main, which under the rapidly growing consumption would have been inevitable, has for the present been deferred. In the meantime, consumers wishing to use hose have been informed that a supply can be furnished to them by meter at a charge of 1s. 4d. per 1000 gallons, *plus* the cost of the meter and of fixing it.

Deep Artesian Boring.—A deep artesian well at Fort William M'Kinley, Philippine Islands, was recently drilled 1007 feet through the soft volcanic rock, and secured an excellent supply of water which rises within about 30 feet of the surface. According to some particulars in the "Engineering Record," the hole was drilled with an ordinary artesian well boring machine, having a string of tools 40 feet long which weighed about 2 tons. With them the hole was sunk in successive lengths up to 100 feet or more, and cased with steel pipe driven only when the sides of the hole commenced to cave in. The casing was in lengths of from 14 to 22 feet coupled together with outside screwed sleeves, and driven by a hammer striking on a hardwood cushion. It was found that when the hole was bored far enough in advance of the casing to allow the string of tools to be beyond the foot of the latter, the tendency was to ream out the hole to a diameter greater than that of the pipe, and thus provide clearance, so that the pipe would often descend very readily. The upper portion of the casing was 10 inches in diameter, and the size was reduced successively to 8 and 6 inches. The work was accomplished by ordinary methods by six men in about four months.

Dewsbury Corporation Gas Supply.—The annual abstract of accounts of the Dewsbury Corporation shows that during the past year the expenditure under the head of revenue in connection with the gas-works amounted to £30,009, and the income to £36,334; leaving a surplus of £6325. This was disposed of as follows: Transfer to gas contingent fund, £500; to revenue surplus account, £5825. Coal and labour on coal cost £10,350, compared with £11,404 the previous year; wages paid to men at the works came to £1918, against £1925; repairs and maintenance of works and plant involved an expenditure of £1228; distribution of gas cost £1931, compared with £1833; general management expenses (including £894 transferred to the Corporation's joint expenditure account) came to £1341; and there was paid in rents, rates, taxes, and insurance £3489. The number of cubic feet supplied was 163,649,900; and the amount received, after making allowances for discounts and leakages, was £29,953, or about £807 less than in the previous year. Meter and stove rents yielded £849; and £9229 was received for residuals, compared with £8335. The contingent fund stands at £2657. The balance-sheet shows assets amounting to £267,233, including £229,827 for works and extensions. There is a surplus of assets over liabilities of £79,878.

Water Supply of an Irish Town.—In the House of Commons on Thursday, Mr. Charles Craig asked the Chief Secretary to the Lord Lieutenant of Ireland whether he was aware that the water supply of Crossgar, County Down, is unsatisfactory, and that two wells completed a year ago are not yet in use, owing to a dispute as to the area of charge for their construction; and, if so, whether the Local Government Board will take steps to ensure that the inhabitants will have the benefit of the new supply as soon as possible. Mr. Wyndham replied that in December, 1902, in accordance with a resolution of the Council, the Board fixed an area of charge for the expenses in connection with the provision of a water supply at Crossgar. Recently the Council requested the Board to fix a more restricted area for the purpose, and they were informed, in reply, that certain legal points in regard to the making of Orders declaring areas of charge for sanitary expenses are not finally settled by the decision given in the Ballycastle case. Under the circumstances, and in view of the fact that another case is pending, the Board have decided to postpone for the present the consideration of applications such as the present. This, however, he added, should not prevent the District Council from proceeding with the execution of all necessary sanitary works in their district, as the question at issue will be dealt with at the earliest practicable date.

Highbridge Water Supply.—Mr. H. Ross Hooper, M.A., M.Inst.C.E., recently attended at the offices of the Highbridge Urban District Council to inquire into the application of the Council to borrow £9998 for the purpose of having a good water supply for the district. Mr. B. C. Board said the Council had endeavoured to obtain a supply of water from various places in the district, including the Mendip Hills and Pawlett Hill. On the 8th of December last an agreement was entered into with the Axbridge Rural District Council to join them in a scheme for conveying water from Charterhouse. Mr. A. Powell (the Engineer of the scheme) said that, so far as the reservoir was concerned, he was allowing 45,000 gallons, or 20 gallons to every unit of the population. Regarding the making of the reservoir, he had adopted steel underneath, with a coating of ferro-concrete; but after argument with the Inspector, he should now recommend the Axbridge Rural District Council to withdraw the plan, and have the reservoir made entirely of ordinary concrete. In response to further inquiries, he said he had computed that the quantity of water required from the springs would be 120,000 gallons—viz., 40,000 gallons for Cheddar, 20,000 gallons for Axbridge, and 60,000 gallons for Highbridge. The Axbridge Council had a right to tap a main at any place provided they supplied Highbridge with not less than 60,000 gallons of water. Dr. Wade said the present Highbridge water was unfit for consumption, being brackish and salty, on account of percolation from the river. It was not, however, polluted by sewage. The inquiry then terminated.

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Messrs. W. Sugg and Co., Limited, are to substitute incandescent for the existing flat-flame burners in the Council Chamber of the Lambeth Town Hall.

The Matlock and District Gas Company have placed an order with Messrs. Clapham Bros., Limited, of Keighley, for an "Eclipse" washer-scrubber, to pass 500,000 cubic feet of gas per 24 hours.

The Gas Committee of the Southport Corporation have resolved to apply to the Local Government Board for a Provisional Order to enable them to borrow a further sum of £5000 for gas stoves, &c.

In connection with the scheme for the supply of water to the Naval works which are about to be erected at North Queensferry, the Dunfermline District Committee this week let the contract for the construction of a reservoir to Messrs. James Young, Limited, of Glasgow, at the price of £34,094.

Among the work that Messrs. Ashmore, Benson, Pease, and Co., Limited, have in hand at the present time are an extension of storage capacity for the Brotton Gas Company, additions to the retort-benches of the Nelson (N. Z.) City Council, and an order for purifiers of the luteless type for the Birstall Gas-Works.

The Galston Gas Company, Limited, Bridge Street, Galston, was registered in Edinburgh last week. The Company is formed to take over the business of the Galston Gaslight Company. The capital is £8595, in 7806 ordinary shares of £1 each and 1578 deferred shares of 10s. each. The public are not invited to subscribe.

Messrs. Joseph Taylor and Co. have received orders for their latest make of 1½-inch plate lead detachable steam, ammonia, and acid pipe saturators, in connection with the new sulphate of ammonia plants now being erected for the Tunbridge Wells and Elland-cum-Greetland Gas Companies. Also for the erection of an intermittent plant for the Birmingham and Gloucester Navigation Company, for their Sharpness Gas-Works, and a plate lead saturator for the Maryport Gas-Works.

The Chemicals Proprietary Company, Limited, has been registered with a capital of £100,000 in £1 shares, to adopt an agreement with the Eschweiler-Woltereck Process Syndicate, Limited; to acquire patents, rights, licences, concessions, inventions, and the like; and to carry on the business of manufacturers of ammonia and compounds and salts of ammonia, sulphuric acid, nitric acid, acetic acid, acetone, acetate of lime, acetic acid salts, tar, naphtha, paraffin wax, and other products of the destructive distillation of carbonaceous material, water and producer gas, coal gas, alkalis, alkaline salts, charcoal, or coke, &c.

The (New) Toddington and District Gaslight and Coke Company, Limited, has been registered with a capital of £20,000, in £5 shares (3000 6 per cent. preference), to adopt an agreement, dated July 18, between the Gas-Works Supply and Construction Company of the one part and B. Clark (for the Company) of the other part, to acquire a certain existing gas-works and undertaking, and to carry on, in or near the town of Toddington, Bedfordshire, the business of producers and suppliers of gas, manufacturers of, and dealers in, coke, coal tar, pitch, asphaltum, ammoniacal liquor, and other residual products of the manufacture of gas, &c.

The Richmond Gas Stove and Meter Company, Limited, have held exhibitions with lectures at Swaffham, Billericay, and Southminster, the gas-works in which towns are the property of Mr. Worthington Church. They also canvassed the districts with good results. Instrumental music was introduced at intervals during the demonstrations, at which the attendance was very satisfactory; and a considerable number of new consumers were obtained, both for ordinary cookers and on the prepayment system. The price of gas at the two lately acquired works has been reduced—viz., at Swaffham by 1s. 2d. per 1000 cubic feet within twelve months, and at Southminster by 2s. 2d. within the past two years.

The report to be submitted to the shareholders of the Leeds Fire-Clay Company, Limited, at the fifteenth annual general meeting, states that, after charging £11,203 for interest on debentures to the 30th of June, and £2637 for premium on the redemption of debentures, the divisible profit, including £13,811 brought forward, amounts to £37,384. Deducting the interim dividend paid in January at 3 per cent. for six months on the preference shares (£18,000), there remains a balance of £19,384, less at 3 per cent. for six months on the preference shares paid on July last, £18,000, leaving to carry forward £1384. The Directors regret that the results of the year's trading are unsatisfactory, and that no dividend has been earned on the ordinary shares of the Company.

At the last meeting of the Middlesex County Council, the Committee in charge of the recently erected asylum at Naysbury reported that the kitchen fittings were designed to be worked by coal and steam entirely. The Committee believed that if these were altered to cook by gas and steam they would be much more convenient, more cleanly, and more economical in working, and would give more opportunities for women's work. It was also desirable that gas should be laid on to the building to provide against failure of the electric light. It would be cheaper to obtain a supply from the St. Albans Gas Company than to manufacture the gas on the estate. The report was adopted, and the Committee were authorized to enter into negotiations with the Company, and to expend £1850 in laying mains, purchasing fittings, &c.

A large number of members of the Institute of Sanitary Engineers, of which Mr. W. H. Maxwell, the Borough Engineer of Tunbridge Wells, is President, recently visited the town, and spent a very enjoyable day inspecting the municipal works. The party were received at the Town Hall by the Mayor (Alderman E. Elvy Robb), who extended to them a hearty welcome. He expressed the gratification of the members of the Council and himself at finding the Borough Engineer had been elected President of the Institute; and said he thought their choice had been justified. He concluded by informing the party that they would not find the undertakings in the town on a grand scale; but he assured them that all those which were under the charge of their President gave every satisfaction. Under the direction of Mr. Maxwell, the party then set out in brakes for the Northern Sewage Farm and the High Brooms brickworks. Following luncheon, the visitors continued their tour to Pembury, where they went over the water-works and inspected the new sewage bacteria beds.

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TOTTENHAM AND EDMONTON GAS COMPANY. Tottenham, August 25, at 3.30 o'clock.

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JOHN RILEY & SONS, Chemical Manu- facturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

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BALE & CHURCH will be pleased to send Samples and Quotations, and make Offers for SPENT OXIDE.
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H. GREENE & SONS, Ltd., are pre- pared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
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IRON and Tin Plate Worker requires Outdoor Work. Has Tools and Machines for turning out best work at a low price. Used to Gas Apparatus, &c.
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WANTED, by a Practical Gas Engineer (disengaged) a Position as ASSISTANT ENGINEER, DRAUGHTSMAN, or would act as CLERK of WORKS for Gas or Water Works, or Represent firm of Gas Engineers. Last employment on large Gas-Works four years. Good References.
Address No. 4254, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

APPOINTMENT wanted as Assistant- MANAGER in Gas-Works. Trained at Engineering Works. Recently prepared Drawings and Superintended erection of large up-to-date Gas-Works. Good knowledge of Chemistry and Gas-Works routine. Honours Gas Manufacture.
Address No. 4178, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING MANAGER.

WANTED, a Situation as Working MANAGER on a small Gas-Works. Seventeen years thorough practical Experience in the Manufacture of Gas from Retort to Burner, can read and fix Meters, good Carbonizer, and well up in Shovel Charging. No family.
Address No. 4255, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Man with good connec- tion among Gas Companies and others for Pushing Iron and Brass Castings, Tools, and General Supplies.
Apply, by letter, giving full Particulars, to W. A. T., care of Messrs. GILBERT AND FIELD, 67, MOORGATE STREET, E.C.

AGENCY for France Wanted.—A thoroughly Competent Agent (aged 36) is desirous of undertaking, for France, the Representation, on Commission, of Firms doing business in Gas or Electric Engines, Lubricants, Accessories, or Specialities, &c.
Address (in English) M. ENREL, Poste Restante, ROUEN, France.

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Contractors for Complete CARBONIZING PLANTS and every description of GAS APPARATUS and ELEVATING and CONVEYING PLANT, ROSE MOUNT IRON-WORKS, ELLAND.

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WANTED, a competent Draughtsman.
Apply, by letter only, stating Experience and Salary required, to Mr. J. HOLLIDAY, Engineer, Gas-Works, St. Mark Street, HULL.

GAS-FITTER wanted, used to Main and Service Laying, Meter Fixing, &c. Permanent position to a steady, reliable man.
Apply, stating Age, Wages, and enclosing Testimonials, to the MANAGER, Gas-Works, HOLMFIRTH.

WANTED, a Gentleman as a REPRESENTATIVE for the North of England. One with a Connection among Gas Engineers and Managers preferred. Liberal Terms offered.
Apply, by letter, to No. 4252, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

APPLICATIONS are invited from persons competent to undertake the duties of ACCOUNTANT and CHIEF CLERK in a Gas and Water Company's Office. Applicants must be of good address, not under Thirty Years of Age, write a good hand, be quick and accurate at figures, thoroughly understand Book-keeping, and be well conversant with Gas and Water Rental, the general routine of books of a Gas and Water Office, and be able to control office staff. None need apply who have not held similar position. Salary offered to commence 45s. per week.
Applications, in first instance, together with *copies* of recent Testimonials, to be addressed to No. 4253, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

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Managers and Secretaries desirous of selling to best advantage, please communicate with DENT AND CO., Ouse Chemical Works, SELBY.

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Write J. WRIGHT, 181, Queen Victoria Street, LONDON, E.C.

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W. NIXON,
Manager.

South Bank, Aug. 3, 1904.

BOOKS FOR SALE.

"CLEGG'S Treatise on Gas," Fourth Edition. "Richards' Treatise on Gas." "Gas Manipulation," by Sugg. "Practical Photometry," by Dibdin. "Metropolis Gas Inquiry for 1867." "Arbitration Proceedings between A. A. Croll and the Great Central Gas Company." "Sulphur Compounds." "Report of Committee of House of Commons Gas Inquiry, Session 1877." "Hartley's Gas Analyst's Manual." "Gas Associations Reports," from 1884 to 1900 complete. "Gas Institute Reports," from 1871 to 1903 complete. "Gas Journals," from 1847 to present time, almost complete each year, only a number here and there wanting.
There are some minor Works which may not be sent forward, but if asked for could be sent forward.
All above Books in good order. Postage or railway charges to be paid by Purchaser.
Offers to No. 4251, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SULPHATE PLANT AND SCRUBBER.

THE Gas Committee of the Clonmel Corporation invite TENDERS for a SULPHATE of AMMONIA PLANT and a 6-ft. by 40-ft. TOWER-SCRUBBER.
Prints of Plans, and copies of Specification may be had on application to Mr. Isaac Carr, M.Inst.C.E., Widnes.
Endorsed Tenders to be sent to Thos. Phelan, Esq., Chairman of the Gas Committee, Clonmel, on or before the 24th of August, 1904.

By order,
JOHN F. O'BRIEN,
Town Clerk.

Clonmel, Aug. 3, 1904.

METROPOLITAN WATER BOARD.

TENDER FOR COAL.

THE Metropolitan Water Board invite TENDERS for the supply of 3000 Tons of Large Welsh STEAM COAL.
Forms of Tender and Contracts may be obtained on application to the undersigned, to whom sealed Tenders, on the prescribed Forms, must be delivered on or before the 16th of August, 1904.

A. B. PILLING,
Clerk of the Board.

Savoy Court, W.C.

GLASGOW CORPORATION.

(GAS DEPARTMENT.)

THE Corporation invite Tenders for the supply of such METERS as may be required by them for Twelve Months from the date of acceptance.
Forms of Tender may be obtained on application to Mr. Alexander Wilson, the Manager, at his Office, 45, John Street, Glasgow, and sealed Offers, marked "Gas Department, Tender for Gas-Meters," addressed to the Subscriber, will be received by him on or before Tuesday, the 23rd curt.
The Corporation do not bind themselves to accept the lowest or any Offer.

JAMES G. MONRO,
Town Clerk.

City Chambers, Glasgow,
Aug. 1, 1904.

COUNTY BOROUGH OF SALFORD.

(GAS DEPARTMENT.)

THE Gas Committee are prepared to receive TENDERS for the supply of 500 Tons of OXIDE OF IRON Purifying Material.
Full Particulars may be obtained on application to Mr. William W. Woodward, Engineer, Gas Offices, Bloom Street, Salford.
Sealed Tenders, endorsed "Tender for Oxide," addressed to the Chairman of the Gas Committee, Town Hall, Salford, to be delivered to me not later than Three p.m. on Thursday, the 18th of August, 1904.
The Committee do not bind themselves to accept the lowest or any Tender.

L. C. EVANS,
Town Clerk.

Town Hall, Salford,
Aug. 4, 1904.

NEWTON-IN-MAKERFIELD URBAN DISTRICT COUNCIL.

TO TAR DISTILLERS AND OTHERS.

THE Gas Committee of the above Coun-cil invite TENDERS for the surplus TAR which may be produced at their Gas-Works for a period of One Year up to the 30th of September, 1905 (approximate quantity, about 500 Tons), delivered in the Contractor's own Tanks, free on rail, at Earlestown Station (L. & N. W. Railway).
Form of Tender may be had from the undersigned.
Tenders, endorsed "Tar," addressed to the Chairman of the Gas Committee, Town Hall, Earlestown, Newton-le-Willows, to be delivered at my office not later than the 31st of August next.
The Committee do not bind themselves to accept the highest or any Tender.

C. COLE,
Clerk to the Council.

Town Hall, Earlestown,
Aug. 6, 1904.

EDINBURGH AND LEITH CORPORATIONS' GAS COMMISSIONERS.

THE Commissioners are prepared to re-ceive TENDERS for the supply of about 500 Tons of OXIDE OF IRON suitable for Gas Purification purposes, delivered *ex* Ship, Granton Harbour, free of all charges, or in Railway Waggons, North British or Caledonian Railways, Granton Gas-Works.
Intending Contractors will be required to furnish the Engineer with the fullest Information as regards the material to be supplied, including the percentages of moisture and effective Ferric Hydrate in the mass, as well as the source from which the same is obtained.
Further Particulars may be obtained upon application to Mr. W. R. Herring, Chief Engineer and Manager, Gas-Works, New Street, Edinburgh.
Tenders to be lodged at or before Ten a.m. on Monday the 12th day of September, 1904, sealed and endorsed "Tender for Oxide of Iron," and addressed to the undersigned.
The Commissioners do not bind themselves to accept the lowest or any Offer.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place,
Edinburgh.

COUNTY BOROUGH OF STOCKPORT.

(GAS AND ELECTRICITY DEPARTMENT.)

TO STEEL TUBE MAKERS.

THE Gas and Electricity Committee are prepared to receive TENDERS for WELDLESS STEEL TUBES—about 5000 Yards of 4-inch and 3000 Yards of 3-inch, in lengths from 15 to 35 feet—and also for IRREGULARS.
Specifications and Forms of Tender can be obtained on application to the Engineer, Mr. S. Meunier, Gas-Works, Portwood, Stockport.
Tenders, endorsed "Tubes, &c.," must be addressed to the Chairman of the Gas and Electricity Committee, and sent in not later than Wednesday, Aug. 17 next ensuing.
No Tender will be accepted without satisfactory proof that the firm tendering pays the Trade Union rate of wages and observes the Trade Union number of hours as are usually paid and observed in the district where the goods are made or produced.
The Committee do not bind themselves to accept the lowest or any Tender.

By order,
ROBERT HYDE,
Town Clerk.

Stockport, Aug. 5, 1904.

STRATFORD-UPON-AVON CORPORATION.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of 5000 Tons of good screened GAS COAL or NUTS, for delivery during the Twelve Months ending Sept. 30, 1905.
Forms of Tender and other Particulars can be obtained upon application to the Engineer and Manager.
Tenders to be sent in, and will be accepted only on the Forms supplied, not later than Aug. 31, 1904.
The lowest or any Tender not necessarily accepted.

J. S. CRANMER,
Engineer and Manager.

July, 1904.

TENDERS FOR COAL AND CANNEL.

THE Directors of the Sheffield United Gaslight Company invite TENDERS for GAS COAL, NUTS, and CANNEL for delivery during the period ending June 30, 1905. The Tenders to state whether the Coal is screened or unscreened.
Tenders (Forms for which can be obtained on application) must be delivered to the undersigned not later than the first post on Tuesday, the 16th day of Aug.
The Directors reserve the right to take the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any Tender.

HANBURY THOMAS,
General Manager and Secretary.

Commercial Street, Sheffield,
July 27, 1904.

TOTTENHAM AND EDMONTON GASLIGHT AND COKE COMPANY.

NOTICE is Hereby Given, that the ANNUAL ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at the Gas-Works, Willoughby Lane, Tottenham, on Thursday, the 25th day of August next, at half-past Three o'clock in the afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended the 30th of June, 1904, to declare a Dividend for the same period, to elect two Directors and an Auditor for the ensuing Year, to consider, and, if so resolved, to increase the remuneration of the Directors, and to transact General Business.
The TRANSFER BOOKS WILL BE CLOSED for the CONSOLIDATED STOCKS from the 11th to the 27th of August, both days inclusive.

By order of the Board,
JAMES RANDALL,
Secretary.

Chief Offices: 639, High Road,
Tottenham, July 29, 1904.

MITCHAM AND WIMBLEDON DISTRICT GASLIGHT COMPANY.

(INCORPORATED BY ACT OF PARLIAMENT, 1867.)

NOTICE is Hereby Given, that the SEVENTY-FIFTH ORDINARY HALF-YEARLY GENERAL MEETING of the Shareholders of this Company will be held at the Vestry Hall, Mitcham, in the County of Surrey, on Tuesday, the 23rd day of August, 1904, at Three o'clock in the Afternoon precisely, to receive the Report of the Directors and a Statement of the Accounts for the Half Year ended the 30th day of June last, to declare Dividends, and for General Business.
The TRANSFER BOOKS WILL BE CLOSED from the 8th inst. until after the Meeting.

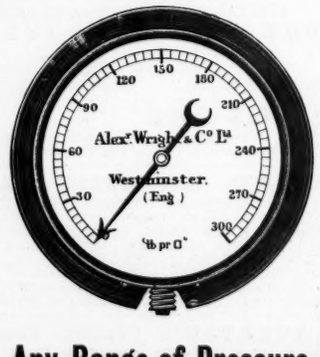
By order,
BENJAMIN GREEN,
Secretary and Manager.

Offices and Works: Western Road,
Mitcham, August, 1904.

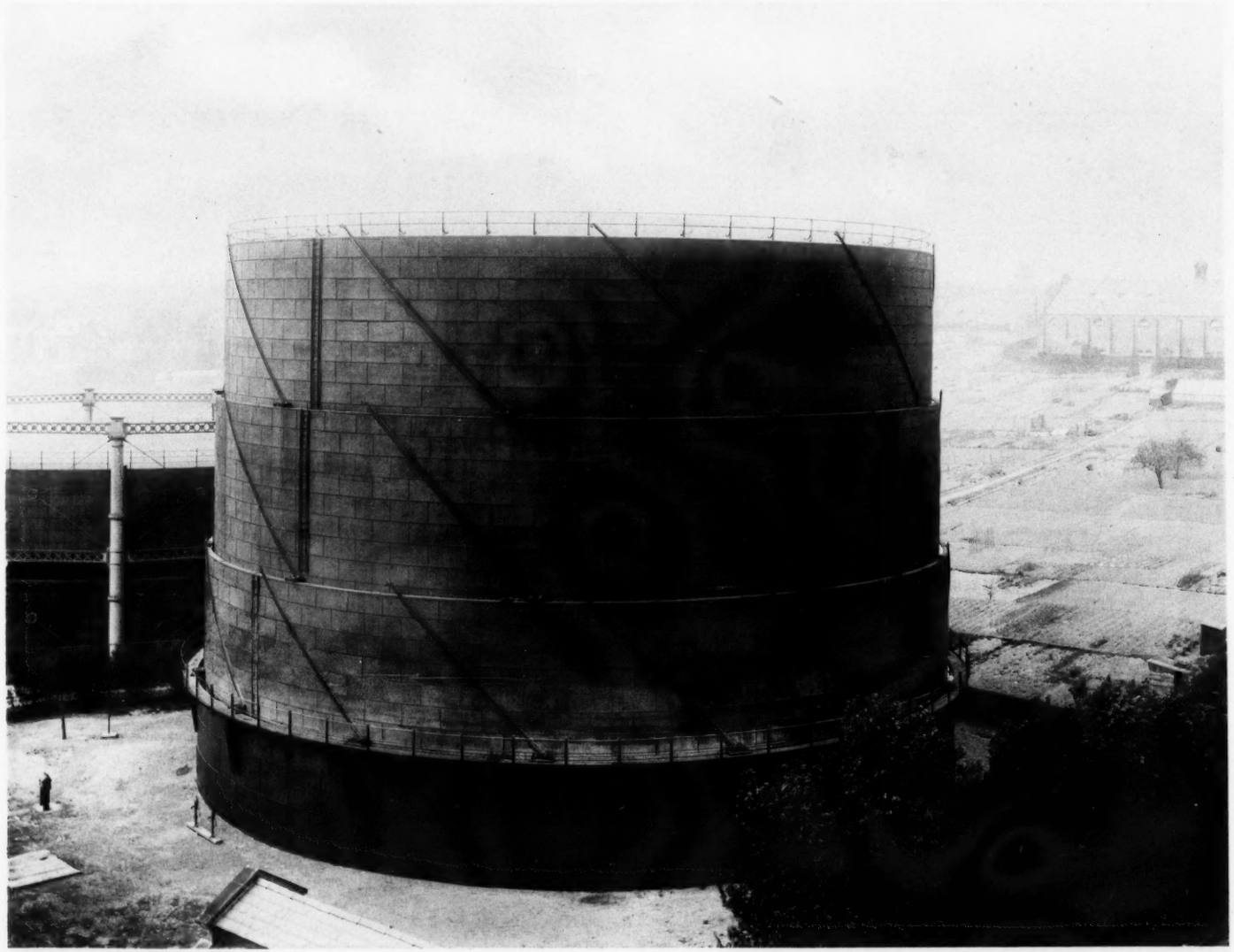
ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at MR. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

STEAM, OIL, and WATER.



Any Range of Pressure.



Chesterfield Gas and Water Board. W. T. Buckland, Engineer.

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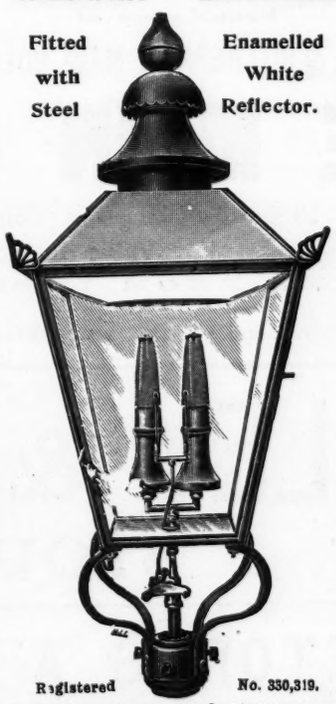

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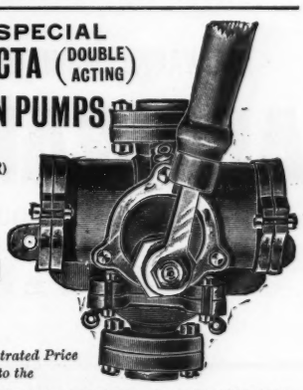

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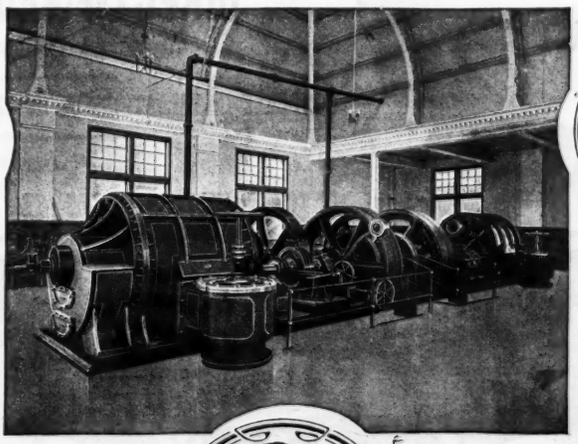

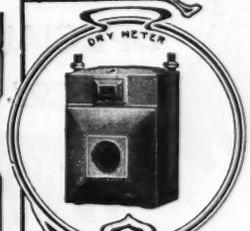

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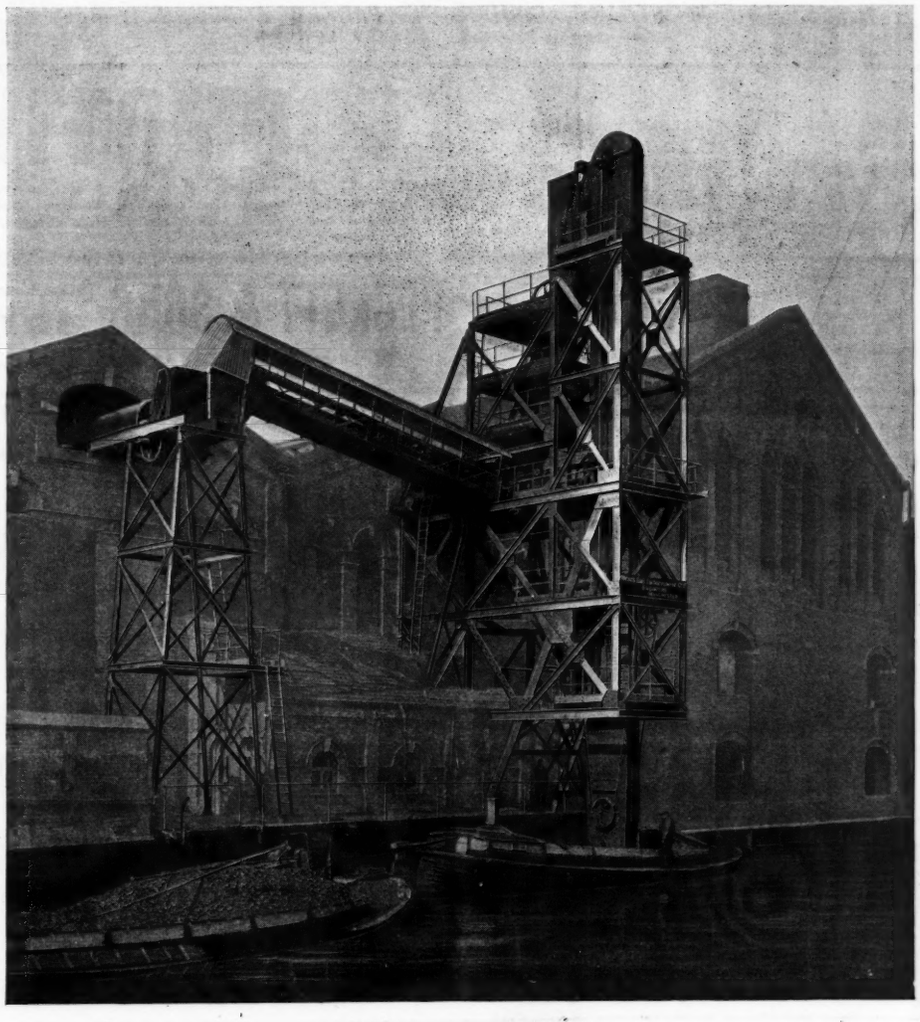

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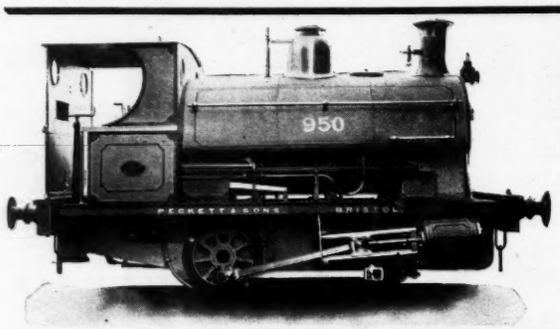

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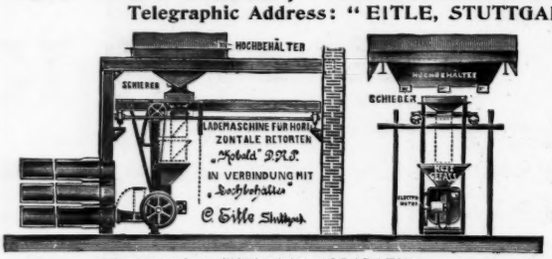
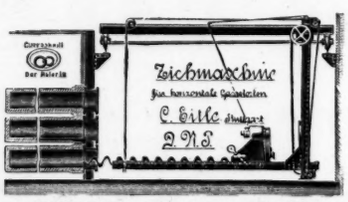


"KOBOLD" CHARGING APPARATUS.



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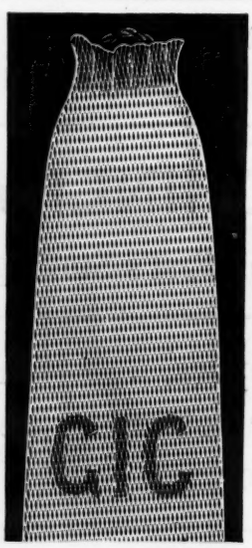

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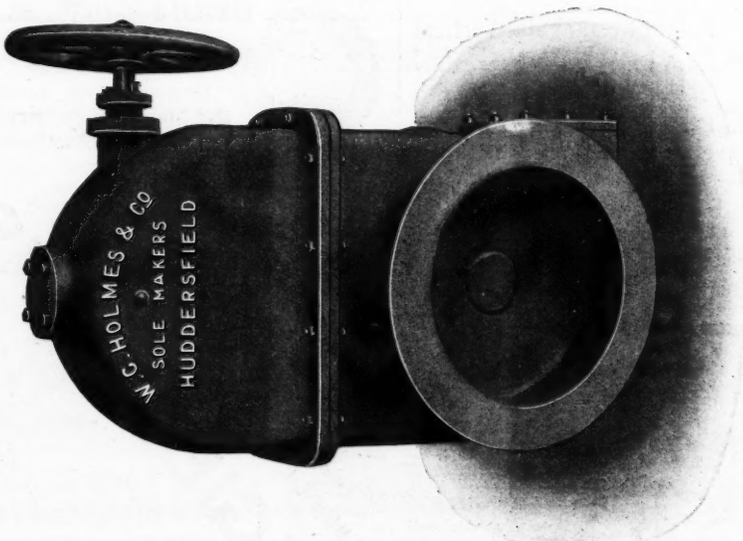

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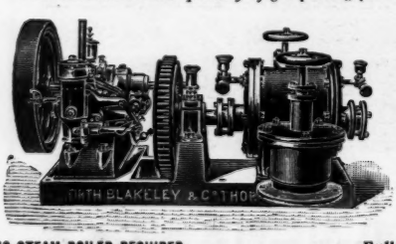

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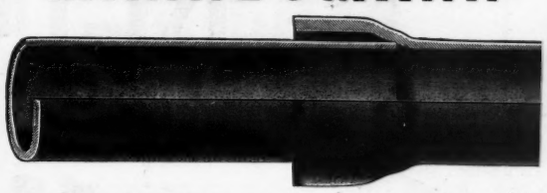

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